Science Curriculum Overview

	Links to KS2	Through sharing of Schemes of work and visits to our feeder primary schools when students are in Year 4, 5 and 6 we have a good grasp of the curriculum that students have been taught in KS2. This has enabled us to plan our KS3 science curriculum to build on previous knowledge. A transition project is completed with students in year 6, carried out in the primary schools continuing into the year 7 curriculum. For example when they are in year 6 students have been working on the electricity topic - which then immediately feeds into the electricity topic that we start with in year 7.					
Intent	**Statement of Intent**	In Science we aspire for all students to develop a deep understanding of our world and their place in the universe. We aim to support students in learning key knowledge and skills that will allow them to reflect on the role humans have in looking after our environment and all the living things in it, protecting it for future generations. We aim to support students as they prepare to demonstrate what they have learnt in their final GCSE exams, so that they can progress and follow pathways in science if they wish at college, university or in future careers					
	Timeline	**Term 1 - 7 Weeks**	**Term 2 - 7 Weeks**	**Term 3 - 7 Weeks**	**Term 4 - 6 Weeks**	**Term 5 - 5 Weeks**	**Term 6 - 6 Weeks**
Implementation Year 7	**Year Overview**	Students study Science for 6 hours a fortnight. Science is taught in topic based units, with each topic lasting approximately 18 lessons / 6 weeks. Topics are based on the National Curriculum at KS3 The curriculum has been reviewed taking into consideration the information we know about the learning that has taken place in KS2 through our strong links with feeder schools, and our excellent KS2 - KS3 Transition programme which means we meet the students in Year 4, Year 5 and Year 6 prior to them joining us. In addition we have reflected on the areas that students find more challenging in KS4 and adapted our KS3 curriculum to better prepare our students for their GCSE science courses. In some cases where classes have two teachers then the students may learn two topics at the same time - with each teacher taking a separate topic and teaching it over a longer period.					
	SOW	**Introduction to Science and Particles Theory (including separation techniques)**	**Cell Biology**	**Waves and Light**	**Organ Systems and Reproduction**	**Forces Springs and Pressure**	**Atomic Structure and Periodic Table**
	Unit Focus	**Introduction to Science** Equipment and Risks, Scientific Method, Collecting and Interpreting data, **Particle Theory,** Changes of State, Diffusion, Gas Pressure, Mixtures and Separation Techniques	History and use of microscope, cells including specialised cells, functions in the cells including respiration and photosynthesis,	Sound waves and detecting sound, Uses of sound, Reflection, Refraction, Colour vision, the eye and the camera	Levels of organisation, gas exchange, respiration and exercise, breathing, Reproductive systems, fertilisation and development of foetus, menstrual cycle.	Forces, Hooke's Law, Contact and Non-contact forces, Pressure in gases, liquids and solids.	Elements V Compounds, Evidence for atoms, atomic structure, periodic table and groups in periodic table
Implementation Year 8	**Year Overview**	Students study Science for 6 hours a fortnight. Science is taught in topic based units, with each topic lasting approximately 18 lessons / 6 weeks. Topics are based on the National Curriculum at KS3. The curriculum in year 8 builds on the core content students have learnt in year 7 and has been designed to help prepare students for their KS4 science curriculum. In some cases where classes have two teachers then the students may learn two topics at the same time - with each teacher taking a separate topic and teaching it over a longer period					
	SOW	**Energy**	**Humans**	**Reactions 2**	**Organisms**	**Matter**	**Resources**
	Unit Focus	Light – investigating reflection and refractions. Transfer of energy – Conduction convection and radiation	Balanced diets and deficiency diseases, bacteria in digestion and fermentation, enzymes - how they work including commercial uses. Respiration and Gas exchange	Oxidation reactions including combustion. The periodic table - developments, patterns and trends.	Classification and Biodiversity, Plant Reproductions. Unicellular Organisms	Particle Model and Changes of State. Night sky, solar system Earth and moon. Discovering the universe, The Big Bang Theory, spacecraft and satellites.	Identifying metals and their properties. Chemical reactions with metals Identifying rocks and the rock cycle
	Enrichment Opportunities	Biology Spelling Bee, Cheltenham Science Festival, IET Faraday Challenge, Visits to Bristol zoo and Aerospace Bristol					
Impact	**Assessment**	Assessment is facilitated through formal mid and end of unit assessment (milestone assessments) which are designed in the style of the GCSE questions. Every lesson starts with a do now activity which links to short, mid- and long-term retrieval. Following the end topic and end of topic milestone assessments students will be given feedback on their work and given a MAC tasks to help them improve their work. Students in Year 10 have formal mock exams in February and in the Summer. Students in Year 11 have mock exams in November and March. These mock exams are followed with detailed question level analysis of their work. This allows teachers to identify any areas that require reteaching followed by a short check to make sure that they tackle any gaps in learning.					
	Literacy and Numeracy links	Literacy and numeracy are pivotal to developing good outcomes for our pupils in all science disciplines. At the start of each unit of work learning starts with an extended reading task. This could be a scientific journal, newspaper article or key text. From this student . understanding is tested though comprehension questions which students need to complete using extended written response frameworks. The use of key texts allows students to develop a baseline understanding of the unit's content as well as broadening horizons of text types. Numeracy concepts are mapped within the curriculum model and have all been cross reference to the maths curriculum for consistency of approach. Within science there are key formula equations for all strands (Physics, Chemistry and Biology) these are displayed in classrooms for student and staff reference.					
	How It Is Used / Skills Set Developed / Outcomes	Students develop their skills in problem solving, investigating through experimentation , communicating scientific ideas, processing data and presenting it in a way that makes it easier to understand. In addition students develop their skills in reading, comprehension and numeracy.					
	Careers in the Curriculum	Students have the opportunity to take part in a wide range of learning experiences outside of the classroom, as part of this finding out more about the potential careers that involve science. For example our trips include the aerospace museum in Bristol, conducting an ecological survey in a nearby woodland, Cheltenham Science Festival and student participation in stem challenges across the year including the engineering challenge run by Lockheed Martin as part of RIAT. To complement our enrichment further we also have links with post 16 providers for students to experience KS5 science as well as CPD for staff to increase challenge from KS4 – KS5 to raise student aspiration.					

** Subject** Curriculum Overview

	Links to KS2	This curriculum has been designed to follow on from the bespoke KS3 curriculum studied by students at Warneford, building on from they key scientific concepts they have learnt in Year 7 and Year 8. It has been carefully sequenced to make sure that students build their knowledge and skills throughout the course. The department reviews the curriculum annually to reflect and adapt the curriculum as necessary					
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	Timeline	**Term 1 - 7 Weeks**	**Term 2 - 7 Weeks**	**Term 3 - 7 Weeks**	**Term 4 - 6 Weeks**	**Term 5 - 5 Weeks**	**Term 6 - 6 Weeks**
Implementation Year 9	**Year Overview**	Year 9 is a key transition year where students cover content that is found both in the KS3 National Curriculum and also in the KS4 GCSE Specifications. They will start to look at GCSE exam style questions as they prepare to demonstrate the science that they have learnt in more formal questions. Throughout this year students develop their experimental skills, looking at how to plan investigations, carry out experiments to gain accurate results and analyse results and draw conclusions.					
	SOW	**Key Concepts in Biology**			**Cells and Control**		
	Unit Focus	Microscopes Plant and animal cells Core Practical - using microscopes Specialised Cells inside bacteria Enzymes and nutrition Testing Foods Core Practical - Testing Foods Enzyme Action Enzyme Activity Core Practical - Enzymes and pH Transporting Substances Core Practical Osmosis in potato slices			Mitosis Growth in Animals Growth in Plants Stem Cells The Brain Brain and Spial Cord Problems The nervous system The eye Neurotransmission Speeds		
Implementation Year 10	**Year Overview**	Students have 12 lessons a fortnight, split into 4 lessons for Biology, 4 lessons for Chemistry and 4 lessons for Physics. Lessons are taught by specialist teachers. Students build on the content taught in year 9, developing their skills and exploring new ideas. Two groups of students will follow the triple science curriculum, whilst the other groups all follow the combined science curriculum					
	SOW	**Genetics**		**Natural Selection and Genetic Modification**	**Health and Diseases and the Development of Medicines**	**Plant Structures and their Functions**	
	Unit Focus	Sexual and asexual reproduction Meiosis DNA DNA Extraction Protein synthesis Genetic Variation and phenotypes Mendel Alleles Inheritance multiple and missing alleles Gene Mutation Variation		Evidence for Human Evolution Darwin's Theory Classification Breeds and Variety's Tissue Culture Genes in Agriculture and medicine GM and agriculture Fertilisers and biological control	Health and Diseases Non - communicable Diseases Cardiovascular Diseases Pathogens Spreading Pathogens Virus Life Cycles Plant defences Physical and Chemical Barriers The immune system Antibiotics Core Practical - Antibiotics Monoclonal Antibodies	Photosynthesis Factors that affect Photosynthesis Absorbing Water and Mineral Ions Transpiration and Translocation Plant Adaptations Plant Hormones Use of Plant Hormones	
Implementation Year 11	**Year Overview**	Students have 9 lessons a fortnight, split into 3 lessons for Biology, 3 lessons for Chemistry and 3 lessons for Physics. Lessons are taught by specialist teachers. Students build on the content taught in year 9, developing their skills and exploring new ideas. Two groups of students will follow the triple science curriculum and have an additional 5 hours of science time allocated.					
	SOW	**Plant Structures and their Functions (Continued)**	**Animal Coordination, Control and Homeostasis**	**Exchange and Transport in Animals**	**Ecosystems**		
	Unit Focus	Photosynthesis Factors that affect Photosynthesis Absorbing Water and Mineral Ions Transpiration and Translocation Plant Adaptations Plant Hormones Use of Plant Hormones	Hormones Hormonal control of metabolic rate the menstrual cycle Control of Blood Glucose Type 2 Diabetes Thermoregulation Osmoregulation the Kidneys	Efficient transport and exchange Factors addicting Diffusion The circulatory system The Heart Cellular Respiration Core Practical - Respiration Rates	Ecosystems Energy Transfer Abiotic Factors and Communities Core Practical - Quadrats and Transects Biotic Factors and communities Assessing Pollution Parasitism and mutualism] Biodiversity and humans Preserving Biodiversity Food Security		
	Enrichment Opportunities	All students take part in a visit to a local forest to undertake an ecological field work study on plants. This gives students a real life experience of the application of the topics they learn in Ecology.					
Impact	**Assessment**	Assessment is facilitated through formal mid and end of unit assessment (milestone assessments) which are designed in the style of the GCSE questions. Every lesson starts with a do now activity which links to short, mid- and long-term retrieval. Following the end topic and end of topic milestone assessments students will be given feedback on their work and given a MAC tasks to help them improve their work. Students in Year 10 have formal mock exams in February and in the Summer. Students in Year 11 have mock exams in November and March. These mock exams are followed with detailed question level analyses of their work. This allows teachers to identify any areas that require reteaching followed by a short check to make sure that they tackle any gaps in learning.					
	Literacy and Numeracy links	Literacy and numeracy are pivotal to developing good outcomes for our pupils in all science disciplines. At the start of each unit of work learning starts with an extended reading task. This could be a scientific journal, newspaper article or key text. From this students understanding is tested though comprehension questions. The use of key texts allows students to develop a baseline understanding of the unit's content as well as broadening horizons of text types. In many cases the extended reading tasks links the topic to current scientific issues or developments. Numeracy concepts are mapped across the schemes of work and have all been cross reference to the maths curriculum for consistency of approach. All science classrooms have common teaching aids displayed in the rooms including the common formula used in Physics, Chemistry and Biology, the key command words used in examination questions, as well as common prefixes and suffixes used in tier 3 words in science					
	How It Is Used / Skills Set Developed / Outcomes	Students develop their skills in problem solving, investigating through experimentation , communicating scientific ideas, processing data and presenting it in a way that makes it easier to understand. In addition students develop their skills in reading, comprehension and numeracy.					
	Careers in the Curriculum	Students have the opportunity to take part in a wide range of learning experiences outside of the classroom, as part of this finding out more about the potential careers that involve science. For example our trips include the aerospace museum in Bristol, conducting an ecological survey in a nearby woodland, Cheltenham Science Festival and student participation in stem challenges across the year including the engineering challenge run by Lockheed Martin as part of RIAT.					

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	SOW	**States and Mixture, Atomic Structure and the Periodic Table**			**Chemical bonds & Acids and Bases**		
	Unit Focus	States of Matter Mixtures Filtration and crystallisation Paper Chromatography Distillation Core Practical - investigating inks Drinking Water Structure of an Atom Atomic number and mass number Isotopes Elements and the Periodic Table Electronic configuration and the Periodic Table			Ionic bonds ionic Latices properties of ionic compounds Covalent Bonds Molecular compounds Allotropes of Carbon Properties of Metals Bonding Models Acids Alkalis and Indicators Bases and Salts Core Practical - Preparing Copper Sulphate Alkalis and Balancing equations Core Practical - Investigating neutralisation Alkalis and neutralisation Reactions of acids with metals and carbonates solubility		
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	SOW	**Chemical Calculations**	**Electrolysis and Reaction of Metals**		**Periodicity**	**Physical Chemistry**	
	Unit Focus	Mass and Empirical Formula Conservation of Mass Moles Yields Atom Economy Concentrations Acid - Alkali Titrations Molar volume of gasses Fertilisers and the Haber Process Factors affecting equilibrium	Reactivity Ores Oxidation and Reduction Life Cycle Assessment Dynamic Equilibrium Transition Metals Corrosion Electroplating Alloying Uses of Metals and their Alloys		Group 1 Group 7 Halogen Reactivity Group 0	Rates of Reaction Factors affecting reaction Rates Core Practical - Investigating Reaction Rates Catalysts and activation energy Endothermic and Exothermic reactions Energy Change in Reactions	
Implementation Year 11	**Year Overview**	Students have 9 lessons a fortnight, split into 3 lessons for Biology, 3 lessons for Chemistry and 3 lessons for Physics. Lessons are taught by specialist teachers. Students build on the content taught in year 9, developing their skills and exploring new ideas. Two groups of students will follow the triple science curriculum and have an additional 5 hours of science time allocated.					
	SOW	**Fuels and Combustion**	**Earths Atmosphere**	**Hydrocarbons**	**Materials**		
	Unit Focus	Hydrocarbons in crude Oil and natural gas Fractional Distillation of Crude Oil The alkane homologous series Complete and incomplete combustion Combustible fuels and pollution breaking down hydrocarbons	The early atmosphere the changing atmosphere the atmosphere today climate change	Alkanes and Alkenes Reactions of Alkanes and Alkenes Ethanol Production Alcohols Core Practical - the combustion of alcohols Carboxylic Acids	Addition Polymerisation Polymer properties and uses Condensation polymerisation problems with polymers flame tests and photometry tests for positive ions tests for negative ions Core Practical - identifying ions choosing materials composite materials nanoparticles		
	Enrichment Opportunities	Trip to the Natural History Museum in London and opportunities to attend Oxford Science Lectures					
Impact	**Assessment**	Assessment is facilitated through formal mid and end of unit assessment (milestone assessments) which are designed in the style of the GCSE questions. Every lesson starts with a do now activity which links to short, mid- and long-term retrieval. Following the end topic and end of topic milestone assessments students will be given feedback on their work and given a MAC tasks to help them improve their work. Students in Year 10 have formal mock exams in February and in the Summer. Students in Year 11 have mock exams in November and March. These mock exams are followed with detailed question level analysis of their work. This allows teachers to identify any areas that require reteaching followed by a short check to make sure that they tackle any gaps in learning.					
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	SOW	**Waves**			**The Electromagnetic Spectrum**		
	Unit Focus	Describing Waves Calculating Wave Speed Core Practical - Investigating Waves Refraction Ears and Hearing Ultrasound Infrasound			Ray Diagrams Core Practical - Investigating Refraction Colour Lenses Electromagnetic Spectrum Using the Long Wavelengths Radiation and temperature Core Practical - Investigating Temperature Using the short Wavelengths EM Radiation Dangers		
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	SOW	**Forces and Motion**	**Space**	**Conservation of Energy**	**Forces and Energy**	**Radioactivity**	
	Unit Focus	Vectors and Scalars Distance / Time Graphs Acceleration Velocity / Time Graphs Resultant Forces Newtons First Law Mass and Weight Newtons Second Law Core Practical - Investigating Acceleration Newtons Third Law Momentum Stopping Distances Breaking Distances and Energy Cream Hazards	The Solar System Gravity and Orbits The Life Cycle of Stars Red Shift The Origins of the Universe	Energy Stores and Transfers Energy Efficiency Keeping Warm Stored Energies Non-Renewable resources Renewable Energy Resources	Work and Power Objects affecting each other Vector Diagrams Rotational Forces	Atomic Models Inside Atoms Electrons and Orbits Background Radiation Types of Radiation Radioactive Decay Dangers of Radioactivity Radioactivity in medicine Nuclear Energy Nuclear Fission Nuclear Fusion	
Implementation Year 11	**Year Overview**	Students have 9 lessons a fortnight, split into 3 lessons for Biology, 3 lessons for Chemistry and 3 lessons for Physics. Lessons are taught by specialist teachers. Students build on the content taught in year 9, developing their skills and exploring new ideas. Two groups of students will follow the triple science curriculum and have an additional 5 hours of science time allocated.					
	SOW	**Electricity**	**Magnetic Fields**	**Forces and Energy 2**			
	Unit Focus	Electrical Circuits Current and Potential Difference Current, Charge and Energy Resistance More about resistance Core Practical - Investigating Resistance Transferring Energy Electrical Safety Charges and Static Electricity Dangers and Uses of Static Electricity Electric Fields	Magnets and magnetic Fields Electromagnetism Magnetic Forces The National Grid Transformers and Energy	Particles and Density Core Practical - Investigating density Energy and changes of state Energy Calculations Core Practical - Investigating Water Gas Temperature and Pressure Gas Pressure and Volume Bending and Stretching Core Practical -Investigating Springs Pressure in Fluids Pressure and Upthrust		
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