The Science department's vision is to expose pupils to a plethora of scientific knowledge, cultivating the ability to critically analyse information and to justify their opinions, all pupils will achieve the qualifications and gain the scientific understanding required to flourish in any career, be active global citizens and live lives of choice and opportunity.

What knowledge have we selected in our curriculum and why?

Our science curriculum is driven by the whole-school vision to give students the skills, attributes and academic qualifications to go on to live lives of choice and opportunity. In selecting and sequencing knowledge for our curriculum, we are guided by the national curriculum and led by our whole-school curriculum design principles.

In science, to help enact this vision, we:

- Give pupils the knowledge they need to live healthy and fulfilled lives
- Teach children that everyone can be a scientist
- Explicitly teach scientific skills and provide opportunity for practical, hands on experience

1. Knowledge-rich: At the heart of our science curriculum is the desire to build a secure knowledge of the world around us. We do this by systematically building up the students' schema of our knowledge rich curriculum. In doing so, we believe our students will be able to use a strong knowledge foundation to pursue opportunities and choices, ignited by this curiosity, and have the tools to meaningfully make progress in this pursuit.

2. Backwards planned: We backwards planned our curriculum from A level by meeting as specialists in primary in secondary. As a result, in Early Years we explore scientific concepts relevant to pupil's immediate surroundings and experiences and from year 1 each term focuses on either biology, chemistry or physics. First and foremost, we used the national curriculum and early years foundation stage to ensure we covered the core basics. However, we have carefully sequenced these topics such that they build well, in a spiral, one after another at spaced intervals to enable greater retention. Practical investigation skills (Working Scientifically) are interwoven into the content and are often built into the climax of each topic to enable students to apply the knowledge they have just gained. This also means that the core skills required to be successful in A Level practicals and beyond are explicitly taught from the beginning of the pupils scientific education.

3. Carefully resourced: Our Science Curriculum is delivered through high quality, carefully designed and planned booklets, written by subject specialists. In each unit, key concepts are mapped, planned and revisited so that understanding becomes more sophisticated and nuanced. We use knowledge organisers to clearly set out the key knowledge that pupils will learn in each unit and then multiple examples and non-examples throughout the unit support pupils' understanding.

4. **Aspirational, inclusive and diverse:** Our Science curriculum is aspirational as the content taught gives pupils many opportunities to go beyond the curriculum once a strong foundation of knowledge has been taught. For example, in Year 3 pupils learn about sound and apply this knowledge by the end of the unit to how echolocation works and how acousticians apply the science of sound to design buildings. We teach about a diverse range of scientists and have mapped this to ensure diversity that is reflective of our pupil population. We teach about a range of scientific careers e.g. palaeontologists,

physiotherapists, astronauts and conversationalists to broaden pupils' scope of the scientific careers available to them.

5. Rigorously assessed: Each lesson starts with retrieval practice of key knowledge for the current unit and previous units. Each lesson then begins with introduction of the key knowledge. There are then a set of tasks, which become progressively more challenging throughout the lesson. Where it supports understanding practical elements and demonstrations are woven into each lesson. Due to the careful structure of our curriculum we are able to deliver an aspirational curriculum that frequently goes beyond the national curriculum.

We frequently, rigorously assess pupils so we can map progress and address gaps in knowledge. Pupils complete end of term assessments which get reported back to parents. Our pupils are graded in the same format through KS2 and 3 so that we can track progress through the pupils journey with us.

6. Regularly evaluated: Our Science Curriculum is regularly evaluated based on assessment data, feedback from teachers and feedback from curriculum dives with other school leaders. Changes are made to the curriculum based on these evaluations and in response to the specific needs of each cohort of pupils.

Topic overview colour code: Biology (green), Chemistry (yellow), Physics (blue)

	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Nursery	Our bodies	Hot and cold	Seasons	Being Healthy	Growing	
Reception	Types of material	Hot and cold	Forces	Growing	Ecosystems	Sinking and floating
Year 1	Seasons and seeds		Materials and building		Sound in the animal kingdom	
Year 2	Changing materials	Mixing and making	Exploring light	Space	Healthy humans	Habitats
Year 3	Practical skills	Raw or synthetic materials	Sound	Magnets and forces	Plants	Ecosystems
Year 4	States of matter	Rock cycle	The universe	Light	Human anatomy	Adaptations
Year 5	Separating mixtures	Physical and chemical changes	Electrical circuits	Forces	Reproductive cycles	Humans and animals over time
Year 6	Chemical reactions	Neutralisation	Cells & organisation	Body Systems	Density & thermal energy	Energy and power

Phase 3 (including Y9) long term plan from September 2020:

Year	Cycle	Topic
7	1	**Chemistry II:** conservation of mass, rates of reaction, catalysts, energy changes, atomic structure, metals and non-metals, group 1 and 7.
	2	Physics II: Forces, Friction, Newton's laws, moments, pressure, waves, sound, light, space
	3	Biology II: Food chains, bioaccumulation, photosynthesis, respiration, decay, ecosystems, variation, inheritance, DNA, evolution
8	1	Physics III: Charged particles, electricity, magnets, electromagnets, motors, transformers
	2	Biology III: Circulatory system, plants, microorganisms, disease, immune system, reproduction, IVF
	3	Chemistry III: Atmosphere, rocks, reactivity series, displacement, extraction, Resources, fuels, climate change
9	1	Biology Bridging Course: The building blocks of life, how cells allow life to flourish on Earth
	1.5	Physics Bridging course - Energy stores and transfers
	2	Chemistry Bridging Course: Chemical Reactions, how fundamental interactions between atoms allow us to predict products of chemical reactions and manipulate these for our own gain
	2.5	Biology Bridging Course: The chemistry of life from food to photosynthesis
	3	Physics Bridging Course: part 2
	3.5	Chemistry Bridging Course: part 2

Phase 4/5 long term plan from September 2020:

Year	Cycle	Biology	Chemistry	Physics
10	1	Cells, cell division and organisation	Atomic structure, the Periodic Table and bonding	Energy transfer, resources energy conservation, matter and atomic structure
	2	Animals, plants and disease	Chemical calculations, change and electrolysis	Radioactivity and Electricity (start)
	3	Photosynthesis, respiration and the nervous system	Energy changes, rate and crude oil	Electricity (Finish)
11	1	Homeostasis, reproduction and evolution	Organic reactions, polymers and chemical analysis	Forces and motion
	2	Genetics, ecosystems and biodiversity	Earth's atmosphere and resources	Waves and Magnetism (Space for Separate Science)

	3	Exams	Exams	Exams
12	1	Biological molecules and cells	Organic: bonding and kinetics Inorganic: Atomic structure and amounts of substance	Measurements and their errors, particles and radiation and waves
	2	Organisms exchange substances with their environment	Organic: alkanes, halogenoalkanes and alkenes Inorganic: energetics, equilibrium and redox	Mechanics and materials
	3	Genetic information, variation and relationships	Organic: Alcohols and analysis Inorganic: Group 2/7 and periodicity	Electricity and Nuclear physics
13	1	Organisms respond to changes in their environment	Organic: Carbonyls, aromatics and polymers Inorganic: Acids, bases and equilibrium	Further Mechanics, Thermal Physics, Fields (Including Capacitors and Magnetism)
	2	Genetics, population, evolution and ecosystems	Organic: NMR, chromatography and synthesis Inorganic: Electrode potentials and transition metals	Astrophysics
	3	Exams	Exams	Exams