Dallam School

Science
Biology, Chemistry, and Physics
Curriculum Intent

Why we teach what we teach

Students arrive at Dallam with over a decade of experiences of the science they have encountered in the real world. Our curriculum challenges students to examine their preconceptions about how the world around them works, by developing the knowledge and skills to view the world from the perspective of a scientist. We seek to support our students to be scientifically literate and prepare them with the essential knowledge and skills needed to be successful in a rapidly evolving world which is often shaped by scientific endeavour and discovery.

Core concepts	➢ Our curriculum is ambitious for all students and often exceeds the requirements of the National Curriculum. It identifies the core knowledge, vocabulary, mathematical, and working scientifically skills our students must master at each stage of their learning. ➢ The core scientific knowledge is grouped into **10 Big Ideas** which underpin every branch of science: **forces**, **electricity and magnetism**, **energy**, **waves**, **matter**, **reactions**, **earth**, **organisms**, **ecosystems**, and **genes.** ➢ Students learn how to **work scientifically**; the processes required to do this are broken down into specific skills which are deliberately taught and applied.
How our curriculum builds over time	➢ Our curriculum is based on a spirality which enables students to revisit the **10 Big Ideas** many times during their 5-year journey to GCSE and beyond. It is easier for students to develop mastery though multiple deliberate interactions with the concepts within an idea, allowing students to draw upon prior learning, whilst being challenged to apply their learning to new or unfamiliar contexts. ➢ Our students begin by learning the core knowledge and skills needed to understand the world from the perspective of a scientist. Next our students learn how to apply their knowledge and skills in familiar contexts, before being challenged to solve more complex problems in more demanding and unfamiliar contexts.
Key ingredients of a lesson	➢ Our teachers plan lessons carefully, researching and anticipating common pre-conceptions and misconceptions that students bring to lessons as a starting point for developing their thinking. Teachers use a variety of evidence based approaches and questioning techniques support this and foster a culture where all students are expected to think hard and take an active part in every lesson. ➢ Our teachers explicitly teach the scientific vocabulary needed to support out students to write about science. We use common writing frames to support students in response to specific command words. ➢ Our teachers use the 'Language of Maths in Science' to support students in transferring their mathematical knowledge and skills effectively to their science learning. ➢ Our teachers use retrieval practise strategies to support students to retain and retrieve knowledge. ➢ Our teachers use carefully chosen models to support understanding. ➢ Our students engage in purposeful practical work that is both "hands on" and "minds on".
How we assess the knowledge, understanding and skills of students	➢ Our teachers routinely use diagnostic questioning to probe and respond to the preconceptions and misconceptions our students have. ➢ We use regular and planned low-stakes assessments to provide clear and actionable feedback to students so that they can improve. ➢ After each unit of work, students take assessments which allow their teachers to assess their ability to recall and apply key knowledge and skills.
How we provide cultural capital and extra-curricular opportunities	➢ We routinely provide opportunities for students to explore relevant real-world applications of science. Our students take part in the British Physics Olympiad, British Science Week, and termly themed lessons on current topical science issues. We provide opportunities for students to engage in open-ended enquiry-based project work through CREST Awards. Our older students work to support younger students in themed science clubs.
How we provide stretch and challenge enrichment	➢ Science is taught in the separate disciplines of biology, chemistry, and physics, each with subject specialist teachers who can draw on their extensive subject knowledge to provide opportunities for students to extend their understanding. ➢ We work with other organisations, such as the Institute of Physics, the Royal Society of Chemistry, and local universities, to ensure that our teachers can access high quality professional development, so we can provide the best

	science teaching available. Within the faculty we dedicate meeting time to develop both teaching and learning pedagogy and subject specific knowledge.
How we adapt our curriculum to meet the needs of all students	➢ Our teachers care deeply that every student can make good progress in science. They deploy a range of effective evidence-based teaching strategies to help each learner make good progress. ➢ At GCSE and post-16, we offer a range of qualification pathways to meet the needs of all our students. ➢ We aim to ensure that a student's characteristics are not a barrier to accessing science courses. ➢ Our teachers understand the important role that being scientifically literate has in eliminating the attainment gap in science subjects.
How we link our subject knowledge to the world of work and further study	➢ Our teachers routinely showcase how the skills students are learning are valuable in the world of work, whether their career aspirations are science related or not. We celebrate the career successes of our former students.
How we provide personal development for students	➢ Science develops students' ability to think logically, work collaboratively to solve problems, and be resilient when encountering new concepts and theories about how the world works. Science influences many aspects of our daily lives. We encourage our students be able to think and behave like scientists; to critique claims, to evaluate evidence, to justify conclusions, to consider alternate ideas, and to keep an open mind. We encourage our students to reflect on the reasons why ideas and theories change over time, and to respect different people's faiths, feelings, and values. ➢ In biology, students will consider the social and moral implications of drugs testing and vaccination, as well as the ways in which biology influences the regulation of performance enhancing drugs in sports. ➢ In chemistry, students will consider the social and moral implications of how humans use resources on the planet, as well as ways in which chemistry influences the rules which govern the safe use of chemicals in the home, and risk management in industry. ➢ In physics, students will consider the moral implications of the ways in which we consume the world's resources to generate electricity, as well as the way physics has influenced the laws which govern the road safety and the safe use of nuclear radiations in medicine.