The Quality of Education:
Science - Purpose and Provision

St Christopher's:
A Church of England Academy

That person is like a tree planted by streams of water,
which yields its fruit in season
and whose leaf does not wither-
whatever they do prospers.

Psalm 1:3

The Purpose of Study

God is in all things which makes everything worthy of our investigation.

All pupils and students will experience high-quality Science education which provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science changes lives and is vital to the world's future prosperity from vaccinations to drug delivery to developing X-rays and making wise decisions about the way in which we use the Earth's resources sustainably. With this we will make sure all our pupils and students are taught essential aspects of the knowledge, methods, processes and uses of Science. Through building up a body of key foundational knowledge and concepts, pupils and students are encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena ('Knowing What It Is To Be Fully Alive').

Our ambitious and challenging platform of learning, links throughout to the National Curriculum, but is not limited by it. Through this, we can be sure to develop critical thinking, analytical skills and the ability to carry out high level problem solving. With these skills our pupils and students develop the necessary skills to work effectively with one another and with those of different opinions ('Learning How To Live Well Together'). Pupils and students will understand the important role we all have to play in dynamic ecosystems to use the planet's resources sustainably for the benefit of future generations. Through the study of Science, the world becomes richer with a beauty that goes beyond want we can immediately feel or see. We become deeply connected to each other, the world and the universe. A culmination of all this allows our pupils and students to become compassionate stewards of our global community, rooted strong like an evergreen, never withering, only prospering.

Through our challenging platform we hope to ensure that our pupils and students go on from their time studying with us to be aware of the big ideas underpinning scientific knowledge and understanding ('Securing Wisdom And Understanding'). Regardless of whether our pupils and students go on to study Science at a further level, we hope to see our pupils and students using their skills to connect their learning across their life whether it be; understanding disease, insulation, braking distances, rates of reaction or understanding optimum growing conditions of plants.

Complementing the School Purpose

Foundation Scripture

Being rooted strong like an evergreen, never withering, only prospering has both a Scientific meaning but also an important message which is weaved through our curriculum. Pupils and students in Science will be given the opportunity to 'Prosper' frequently with opportunities within lessons and beyond in activities such as enrichment or trips. Perhaps most important is that Science has ability to help guide curiosity and support understanding of our own place in the changing world through different mechanisms including adaptations, human care for the environment and through complex food webs, this will enable our pupils and students to flourish and 'Prosper' in this amazing, wonderful puzzle of a universe. Like with an evergreen, our pupils and students will be supported to prevent a sense of 'Withering' ensuring they flourish and thrive when encounter a difficult climate.

Key Themes

The knowledge in which our pupils and students acquire is vast within the three Science disciplines. It is our aim to teach our pupils and students that ideas do not stay within a topic but are used across the three disciplines and in real world examples. By ensuring this is happening we are attempting to develop not only knowledge but 'Wisdom' and 'Understanding' across our curriculum. We ensure this by using 'Low stakes high frequency testing' of all the disciplines and topics within lessons.

Pupils and students must work collaboratively within a Science lesson and learn skills in communication, problem solving and understanding. Pupils and students work to emulate collecting results from Scientific experiments from previous scientists and do this by working together. Not only does teamwork play a big part in Science lessons but having the ability to debate and respectfully disagree with opinion on topics such as ethical use of stem cells, the role of genetic engineering or the uses of radiation. We teach our pupils and students the importance of 'Learning To Live Well Together'.

Understanding of the universe and our role in it is the ultimate goal, whether that be a subatomic particle like a quark, how this links to the structure of an atom, or how this fits into the formation of a cell, or further than this in the formation of the universe. In your journey of understanding this, you can really appreciate 'What It Is To Be Fully Alive'.

Christian Virtues

Many pupils and students believe that faith and Science cannot sit hand in hand together. This mindset is something that at St Christopher's we endeavor to change. Often the study of Science focuses purely on facts and for pupils and students it is important to understand where faith is weaved into these facts. The theory of the Big Bang always gets questions such as 'So there is no God then?' or 'If we have evidence for evolution, is the story of Adam and Eve made up?'. We work hard to answer these questions supplying sound reasoning as to why both faith and Science can go hand in hand. Science is not just a subject of theories and numbers either, it allows us through gained knowledge to move forward in peace and hope, to a world without food or energy poverty through innovation. Through collaboration between nations, Science has acted as a key diplomatic glue, allowing friendship and trust between nations as we aim towards a collective goal of a better world. Pupils and students have great opportunities to discuss and reason with one another in topics such as these and we endeavor to ensure this happens in a caring, empathetic and understanding Christian manner. Science is a great force for good in the world, bringing relief and hope to those with little, enriching the lives of all. The sense of being part of a community that looks forward with hope and optimism is an aspiration that pupils and students are encouraged to embrace; it is easy to walk in the way of the selfish, to seek only for personal gain, to criticise and disparage but we are called to meet the challenges of the future in a way that enriches both corporately and individually. In doing so, we encourage friendships and relationships which aren't always built on identical thinking, but relationships from unique individuals built on our Christian virtues such as forgiveness, peace and trust.

Curriculum Aims

Our pupils and students are given access to a carefully crafted spiral curriculum which is rich in knowledge and application. Some topics sit almost independently but most fit throughout the potentially 7-year curriculum which increases in its complexity and difficulty. A specific example of this is how the complexity of an animal or plant cell increases over the 7-year curriculum. In our 7-year curriculum we teach not only content but skills which are imperative for all three Scientific disciplines and across other subjects too. Graph work is a very good example of this, from year 7 we start to develop skills such as identifying variables and knowing which axis to place them on. This knowledge deepens further in the years to follow in ways such as; knowing which type of graph to draw, appropriate lines of best fit, interpreting data and developing conclusions based on data giving scientific reasons why.

Throughout our curriculum we have ensured we promote development beyond just knowledge. Within Science, we study topics which pupils and students may already have developed opinions on. We encourage our pupils and students to debate and air their views whilst reminding them of the Science behind their opinions and we endeavor to ensure this happens in a caring, empathetic and understanding Christian manner. When teaching topics which may be controversial such as 'Abortion', 'Genetic engineering', 'Nuclear power' and 'Sustainable use of Earths resources', we ensure we discuss the cultural and moral implications of these, whilst again, reminding the pupils and students what the Scientific facts are surrounding the topics are.

Science is such an important subject for our pupils and students in a multitude of ways. For our pupils and students to be prepared for adult life they must know the differences between a range of diseases, how to prevent the spread of infection, treatments, being more energy efficient, how we can protect our environment against global warming and much more. It is, however, the acquisition of higher aspirations and the transferable practical, mathematical and independent study skills that we are most proud of in our pupils and students. With knowledge like this, our pupils and students can go on to become compassionate stewards of our global community.

Complementing the School Provision

Teaching Approaches

The Science department is one which is extremely rich in excellent subject knowledge. The most difficult concepts and topics are taught to all pupils and students using a plethora of well researched pedagogical approaches which we use consistently across the department. Appropriate challenge is provided by building on knowledge and understanding from previous topics, giving students the confidence to form appropriate links and apply various concepts between topics. Challenge is promoted through the deployment of effective questioning techniques by teachers in all lessons either verbally or using tried and tested department-based resources. Teachers often model good practice through well planned and structured lessons, that give clear and memorable explanations. As a team we have developed a consistent bank of models embedded into our Schemes of Learning which we use throughout the 7-year curriculum. Constructive feedback on written and verbal responses enables pupils and students to understand how to improve further, this takes a different look throughout the Key Stages but is centred around pupils and students given feedback which they can act upon to aid progression. Model answers are provided, and teachers show pupils and students how to progress and focus on key and command words and then modelling how to structure clear and coherent responses. Every lesson and homework task provide an opportunity for pupils and students to practise using their Scientific knowledge, understanding and skills.

Pupil and Student Attitudes

Our pupils and students arrive 'Ready' to learn, and in doing so they start lessons positively enabling learning to happen promptly. Pupils and students are encouraged to take control of their own learning becoming 'Reflective'. Our pupils and students respond to teacher feedback with the use of green pen. Our pupils and students have developed a resilience through the use of green pen, and they are not afraid to get things wrong, but are actively encouraged to improve all work that they can. Pupils and students appreciate the hard work and expertise of their teachers and in Science and we have worked hard to foster relationships built on strong foundations of 'Respect'. This enables the learning atmosphere of our classrooms to be positive and hardworking.

Going Beyond the Exam Specification

We are extremely proud in which we as a Science department go beyond the specification and national curriculum. Our KS3 pupils have taken part in after school Science Christmas spectaculars and a range of engaging activities during British Science week, including lunchtime quizzes and engineering challenges in lessons. Students are encouraged to challenge and further themselves through their involvement in the British Biology and Chemistry Olympiads, and by their attendance at appropriate lunchtime lectures hosted by a variety of teachers across the department. By teaching current and relevant subject content, it is hoped that students will develop a strong interest in continuing their studies of Biology, Chemistry or Physics beyond A-level, as well as entering a Science related career or profession. Past students have also led lectures to inspire our current students who are thinking of taking medical related degrees at university. Sessions have also been delivered by outside speakers related to selective breeding and plant biotechnology to link A-level Science to real world applications and careers.

Extra-curricular and Enrichment

Pupils and students are provided with many opportunities to develop their understanding of Science outside of the classroom. Many trips are run by the dedicated Science department. Science Live which enables pupils and students to listen to a range of Scientists that are working at the cutting edge of their specialisms. A 5-day residential trip to the Eurospace Centre in Belgium where pupils get to step into the shoes of an astronaut. A trip to Chester Zoo and the Blue Planet Aquarium which allows students to see a wide variety of animals and appreciate their adaptions, the threats to their survival and important conservation work carried out by the scientific community. A trip to the Large Hadron Collider at CERN in Geneva is an extremely popular trip for students and enables them to experience cutting edge research into quantum mechanics and particle Physics. The "Pathway to Medicine" enrichment programme supports and encourages students who are interesting in careers in Medicine, Veterinary Medicine and Dentistry.

Whole School / Cross-curricular Elements

Our 7-year curriculum is structured to develop a range of competent numerical and reading skills and allows pupils and students to see the significance of these by teaching them at the same time as the subject content. In Science we teach the importance of good Spelling, Punctuation and Grammar. In pupils and students work we highlight the importance of this through our use '6 marker' activities. Each year a small number of year 10 and year 12 students apply to become Subject Ambassadors and this important leadership role is vital on Taster Days and Open Evenings, as well as through the mentoring of younger students and pupils. In sixth form, students are given the opportunity to read ahead in lessons and in personal study using learning booklets and PowerPoints. They also provided opportunities to read through key ideas and concepts for consolidation. Starter and plenary activities in lessons often require students to read passages on their own and then apply their understanding through questions. Wider reading is encouraged through the learning library in the sixth form labs and in the student handbooks.

Meeting the Needs of All

We believe that pupils and students with special educational needs should have equal access to a broad, balanced, inclusive and relevant curriculum which is differentiated to meet their individual needs. All our pupils and students will be provided support where required through scaffolded work, sometimes with additional help from teaching assistants.

Ad Gloriam Dei

To the Glory of God

Queens Road West
Accrington
Lancashire
BB5 4AY

01254 232 992
01254 355 215

www.st-christophers.org