



Why is the study of Science important?

Have you ever wondered why the sky is blue? If there are more than 118 elements? Whether there are more undiscovered species of plant or animal? What would the nearest adult answer, if you posed these questions? Could they be answered by the brightest minds in science? The curiosity that lies behind these questions and the drive to find the answers is what makes us human and it lies in the heart of Science.

Answering questions is essentially the whole purpose of science and answering these questions simply brings more questions to the surface. Great scientists, those at the very frontier of what we understand as science knowledge, would still declare that the more we understand about the universe, the more there is to find out. How great is that?

The concise Oxford dictionary defines science as 'systematic and formulated knowledge' that is based on mainly observation, experiment and induction'. Science consists of the interrelated discipline of knowledge and skills- but those of us who have ever questioned the world around us see it as so much more than that. Through science you can learn to develop your own ideas, attitudes and interpretations and not simply acquire a set of skills and knowledge. Throughout our science curriculum you'll see that science skills and knowledge are important but it's the application of these ideas that lead onto the great discoveries. Let's get to discovering...

Understanding the scientific process is a way of thinking and working. Science begins with curiosity and daring to ask questions, seek answers, work through problems and arrive at conclusions. All of which require logical thought and a systematic way of working. A process that is applicable to most scenarios in life! Want to think like a scientist?

Science is an active process. From Year7 we have planned a range of relevant and exciting scientific activities that involve the full range of all the aspects of science. We feel that to be able to think like a scientist you must understand the foundations that led us to our current understanding in the 21 century. To support this, we have allowed the opportunity to recreate the investigations of key scientists and to encourage you to try out your own ideas, where the outcomes are unknown and to prove the validity of a scientific fact or idea.

Our 5 year Science curriculum focuses on thinking, interpreting and evaluating rather than simply memorising scientific facts. It is our conviction that this will make science accessible for all. It is not enough to simply recall facts, it is also important to understand and appreciate how that knowledge was derived, how it came to be discovered and accepted by the scientific community. In science, knowledge is power; with it you can unlock scientific thinking and processes.

I challenge you to describe your journey today to the point where you are reading these words. Within seconds of waking up you have benefited from several products developed as a result of someone's curiosity. Science has provided solutions to a huge number of curiosities and problems, some with great importance (medicine, smart materials) , some abstract (relativity, atomic theory) and some controversial (GM foods, radioactivity).

If you read the poem *The Learn'd Astronomer* by Walt Whitman you'll appreciate that whilst celebrating the contribution that science has made to our lives, we should never be lost in facts, data and results. We must never lose sight of the beauty of our world beyond the analysis and to every now and again observe 'the perfect silence in stars'. Science provides us with answers. Whilst these answers can be useful in feeding our curiosity they should also make us realise that the world around us is far more complex and beautiful than our imaginations could ever conceive.

'Not only is the universe stranger than we think, it is stranger than we can think' Werner Heisenberg

Many would argue that understanding the beauty of the universe is akin to a magician revealing their tricks. But by following our science curriculum you will appreciate that understanding the phenomena makes it even more awe inspiring. We teach a combined science approach in Year 7 to 11 however there is also opportunity to study separate sciences at GCSE. We believe that each science has wonder and importance and so we have shared how we study each science discipline in our science curriculum.

What skills will the study of Science teach you?

You are a citizen in this world and you need to know how the natural and modern world works. It will teach you to...

- Understand theories that explain phenomena
- Apply basic ideas and models that support understanding
- Evaluate models and theories
- Present theories in mathematical form
- Recall quantitative relationships
- Derive quantitative relationships between various measured quantities
- Explain how theories are borne out by experiment.
- Apply experimental procedure and understand that it is a measure of success of a theory
- Present, interpret and evaluate experimental data
- Apply mathematical skills to solve problems
- Develop a deeper understanding of everyday experiences including the natural world and modern devices.

What will you know and understand from your study of Science?

- Develop scientific knowledge and conceptual understanding of science
- Develop understanding of the nature, processes and method involved in science
- Develop and learn to apply observational, practical, modelling, enquiry and problem-solving skills, both in the laboratory, in the field and in other learning environments.
- Develop their ability to evaluate claims linked to biology through critical analysis of the methodology evidence and conclusions, both qualitatively and quantitatively.

How does your study of Science support your study in other subjects?

Study of any subject in our curriculum takes full advantage of links with other subject areas- we term these as interdisciplinary links and we make the most of them because we know that deep learning requires the transference of knowledge and skills from one topic of learning to another. Once you can transfer your learning across topics and subject areas then you are really mastering what you know and how to apply your understanding and skills.

Science encompasses Biology, Chemistry and Physics. You will learn methods of thinking and research that are widely applicable to other subject areas helping your thinking in all subjects. All science relies heavily upon evidence to test predictions and theories. Through developing mathematical techniques as well as applying reasoning your skills to present and justify information can be applied to most careers and further education.

Across the teaching of subjects, teachers will refer to your learning in other areas such as Biology, Mathematics, Physics and Chemistry and this will help you to develop your understanding. There are even opportunities to apply this learning in Y7, 8 and 9 when interdisciplinary study days are organised to deepen your understanding across the curriculum such as when our STEM departments work together to solve a common problem.

How can you deepen your understanding of Science?

Our Science department offers lots of great opportunities for you to really engage with this fabulous subject. We offer an enrichment club, with a different theme each term across KS3. We also offer STEM events and activities that may include opportunities to visit local colleges and universities and visitors to the academy offering extra enrichments such as Robotics. There may be visits to science museums and events that celebrate great scientists and discoveries. As the school grows we will offer after school support sessions for GCSE students and work with other departments to enhance learning such as maths in science and geography in science. Get involved!

How are you assessed in Science?

Throughout the Science course you are assessed using the following assessment objectives which ensure that you can cumulatively build your subject understanding in preparation for future GCSE and A Level study. There are regular assessment points each year that we term Praising Stars©. For younger years we base our assessment on our subject mapping of the age related expectations across the curriculum, assessing students' performance at their current stage of study against expectation. At GCSE we will make informed predictions informed by our holistic assessment of their progress against the key assessment objectives and their aspirational GCSE targets. These are also the basis for any appropriate support and intervention.

Key Assessment Objectives

AO1: Demonstrate knowledge and understanding of:

- Scientific ideas
- Scientific techniques
- Scientific procedures

AO2: Apply knowledge and understanding of:

- Scientific ideas
- Scientific enquiry
- Scientific techniques and procedures

AO3: Analyse information and ideas to:

- Interpret and evaluate
- Make judgements and draw conclusions
- Develop and improve experimental procedures.

How can Science support your future?

Biology, Chemistry and Physics are offered at most prestigious universities either as a single honours or a joint honours subject studied alongside other disciplines e.g. History, English Literature, Medicine, Engineering, Mathematics. The very fact that you have been able to study Science and your analytical thinking and mathematical reasoning will help your future application be they for colleges, universities, apprenticeships or employment.

Careers that the study of Biology, Chemistry or Physics supports include:

- Teaching
- Medicine/Nursing/Dentistry/Veterinary
- Marine Biology

- Conservation
- Geneticist/Genomicist
- Nanotechnology
- Biostatistician
- Law
- Engineering (chemical, electrical, software, medical, civil, mechanical)
- Forensic Science
- Nursing
- Paramedics
- Sports scientists
- Biochemistry
- Pharmacy
- Product development scientist (for example developing makeup and personal care products)
- Geophysics
- Product design
- Aeronautical engineering
- Construction
- Architecture
- Civil or medical engineer,
- Astrophysics
- Astronomer

Science Curriculum Progression Pathway Outwood Academy Riverside

	Year 7	Year 8	Year 9	Year 10	Year 11
Autumn I	Unit 1 Introduction to Science, bridging the gap between KS2 and KS3 and looking at core science skills. Unit 2 - Matter and Energy	Unit 6 - Plants. Ecology and climate change.	Unit 11 - Electricity and Electromagnetism	B1 - Cell Biology C1 - Atomic Structure P1 - Energy	B6 - Inheritance C6 - Rate of Chemical Change P5 - Forces

Autumn 2	Unit 2 - Matter and Energy. Unit 3 - Chemical substances.	Unit 6 - Plants, Ecology and Climate change Unit 7 - Forces	Unit 12- Patterns and Materials	B2 - Organisation P2 - Electricity and Magnetism C2 - Bonding and structure	B7 - Ecology C7 - Organic Chemistry P6 - Waves
Spring 1	Unit 3 - Chemical substances. Unit 4 - Animal Organ systems.	Unit 7 - Forces Unit 8 - Chemical Reactions	Unit 13 - Health and Disease	C3 -Quantitative chemistry P3 - Particle model of matter	C8 - Chemical Analysis C9 - Chemistry of the Atmosphere P7 - Magnetism and Electromagnetism
Spring 2	Unit 4 - Animal organ systems.	Unit 8 - Chemical Reactions	Unit 14 - Sustainability	B3 - Infection and response C4 - Chemical changes	C 10 - Using Resources P8 - Space, triple science only Masterclasses and Revision
Summer 1	Unit 4 - Animal organ systems. Unit 5 - Space, Earth and Sustainability.	Unit 9 - Cells Evolution and Inheritance	End of KS3 assessments and consolidation	B4 - Bioenergetics C5 - Energy changes P4 - Atomic Structure	Masterclasses and Revision
Summer 2	Unit 5 - Space, Earth and Sustainability.	Unit 10. Waves	Transition	B5 - Homeostasis and response P5 - Forces	Revision