



Our vision for Science at Lister:

Science is pivotal for understanding how the world around you works. Science at Lister develops curiosity and questioning, encouraging students to ask why and how things work. The scientific inquiry processes that students learn will help them to work towards these answers. Students will not only learn and master key scientific concepts, but will understand how current theories and models have been developed and also gain an appreciation that the field of Science is ever evolving and we don't have all the answers. Science allows students to both understand key scientific principles and laws and apply these to unknown situations.

What do we teach in Science?

Science at Lister begins with an introduction to Science laboratory topic, to introduce students to the Scientific method key Scientific apparatus and safety in the laboratory. These skills are regularly drawn upon and developed in Science. This is followed by modules in energy, forces, atoms and the particle model and cells. These topics provide students with key knowledge that is needed to move on to understand chemical reactions, organisation systems, bioenergetics and electricity. Students' understanding from one Scientific discipline is frequently drawn on to understand another. For example, the study of acids and alkalis is needed to understand chemical digestion. Practicals, models and real life examples are used throughout to enhance learning and allow students to visualise abstract concepts.

Biology

Biology is the study of living organisms. At KS3, we develop student's understanding of cells at a microscopic level, then develop their understanding of how cells, tissues and organs work together in whole organisms and how organisms interact with each other and the environment. At KS4, students build on their knowledge of cells and organisms. For example students learn about specialised cells and cell division and how our knowledge of this process has helped scientific understanding of cancer as well as manipulation of stem cells in new treatments for diseases. Students develop their understanding of organisms and the environment by understanding the carbon cycle, food chains and human impact on the planet and how biology can be used to increase biodiversity and reduce the effects of climate change. Students will develop knowledge of newer biological methods and be able to discuss ethical issues linked to them, for example the use of embryonic stem cells in therapeutic treatment and the development of genetically modified food.

Chemistry

Chemistry is a science that bridges that gap between physical and biological sciences. It deals with matter at the atomic and molecular scale. Chemistry allows us to understand the differences between materials at an atomic level, understand chemical changes from everyday reactions such as cooking to the chemical reactions that happen in our cells such as respiration as well as allowing for the discovery and development of new materials such as graphene and fullerenes that are used to advance technology in communications, sport and medicine. At KS3, students will learn about the particle model, the periodic table and elements and different types of chemical reactions. At KS4, students will develop their understanding further, for example, learning the history of the periodic table and how scientists have developed our current model of the atom. Students will develop their understanding of the atom and chemical reactions and apply this to larger scale chemistry, for

example, extraction of metals from ores and the separation of crude oil in oil refineries. Students will also develop an understanding of how the chemistry of the atmosphere has evolved and how knowledge of this is used to assess how humans have caused an increase in greenhouse gas emissions. Students will apply their chemistry understanding to learn about methods to reduce this impact.

Physics

Physics is the study of the physical world and how matter and objects interact. Much of physics is underpinned by our understanding of energy and energy transfers. Knowing about energy transfers allows us to ultimately understand the world around us, from the electrical devices we use, the origins of the planet we live on and the Universe we are part of. At KS3, students will learn about energy stores and energy transfers, as well as forces, heating, waves and space. Students will learn about traditional methods of generating electricity and newer methods using renewable energy. Learning about electric circuits introduces students to different types of circuits and how they work; allowing them to begin to understand many of the appliances they use everyday. At KS4, students will further their understanding of energy and begin to learn equations that allow them to quantify energy transfers. Students will develop their understanding of electrical circuits and how the national grid delivers electricity to our homes. Students will develop their understanding of atomic structure and begin to learn about radioactive elements. This will lead to students learning about uses of radiation in nuclear medicine, everyday appliances such as smoke alarms, and in nuclear power plants. Students will learn to be able to evaluate and form an argument when discussing controversial scientific topics, for example nuclear power.

Extra-curricular

We have an extensive extracurricular programme in Science. We use regular DEAR (Drop everything and read) lessons to enhance students exposure to Scientific literature and articles that extend Scientific understanding from the core curriculum. Students are provided with many opportunities to take part in STEM activities outside of the classroom. Weekly STEM club for Year 7 and 8 students allow them to have more experience of practical activities as well as introduce them to experiments not covered on the curriculum. Year 9 students are given the opportunity to take part in the CREST award, an opportunity for students to plan, carry out and analyse their own investigation. KS4 students are provided with opportunities to take part in STEM sessions such as Medical taster days. Each year, we celebrate British Science week with a week-long timetable of activities. Further to this, we work with organisations such as the British Institute to deliver in school Science shows for our students and the community. In order to support student progress, we use a range of strategies: students from LAE tutor Year 11 and we have Science scholars from Year 8-10 to mentor younger students.

Lister Science faculty believes our core curriculum and extra-curricular programme shows all of our students that Science is for them and works to break down previous stereotypes of Scientists and highlight the wider contributions made by Scientists across the world. We want to develop and inspire the next generation of scientists and ensure many of our students go on to study Science post-16 and beyond. For those students who do not study Science at a higher level, we aim to ensure they leave Lister with a level of Scientific literacy that allows them to access information about the world around them and make judgements about information in particular in regards to fake news, advancements in technology and make ethical medical decisions for example regarding organ donation and use of embryonic stem cells.