

## Initial Unit: Autumn Term 1

Year 9

### Maths in Science

This topic builds on mathematical concepts and skills the students have learnt in lower KS3 and KS2. It has been placed at the beginning of year 9 to enable to students to have the mathematical and scientific skills to access the KS3 Year 9 curriculum and beyond.

Students will be able to apply mathematical concepts and calculate results. They will rehearse how to present observations and data using appropriate methods, including tables and graphs. They will be able to interpret observations and data to draw conclusions.

Year 9	Biology	Autumn 1 – 7 weeks	Autumn 2 – 7 weeks	Spring 1 – 6 weeks	Spring 2 – 5/6 weeks	Summer 1 – 5/6 weeks	Summer 2- & weeks
	Course topic	Biology: Health		Biology CREST Project		Biology: Cell Biology CORE concepts	
	Powerful/Core Knowledge	Health is the state of physical, mental and social well-being. It is not just being free from disease . Factors can work together to affect physical and mental health. Lifestyle choices such as smoking, drinking alcohol and taking drugs has an impact on the body. Exercise is a key way in ensuring that our bodies stay healthy.		CREST is a nationally recognised scheme for student-led project work in the STEM subjects (science, technology, engineering and maths). CREST helps young people become independent and reflective learners through enquiry-based project work. Schools will pick the projects that they feel are most suited for their students.		The study of animal and plant cells and how cells have become specialised. These small structures were first observed with the discovery of light microscopes and further enhanced due to the evolution of electron microscopy.	
	Including key people and stories	A Pathogen is a microorganism that can cause disease. Microorganisms are tiny organisms that can only be seen using a microscope. All pathogens are microorganisms but not all microorganisms are pathogens. Students will look at how microorganisms can spread from person to person and look at the work of Ignaz Semmelweis and Edward Jenner.				A variety of processes are required to transport substances into and out of cells such as diffusion, osmosis and active transport and that exchange surfaces have become adapted to allow rapid exchange.	
		<i>Elizabeth Garrett Anderson was an English physician and suffragist. She was the first woman to qualify in Britain as a physician and surgeon.</i>				DNA is the genetic material of a cell. In a nucleated cell the DNA is held in chromosomes. This allows cell division to occur more effectively.	
		<i>Gonzalo Moratorio designed Uruguay's Coronavirus test and national programme leading to Uruguay having the lowest death toll. Katherine Jansen- Head of Vaccine research and development at Pfizer who led her team to design the mRNA Covid 19 Vaccine.</i>				Microscopes Animal and plant cells Specialised animal cells, specialised plant cells Movement in and out of cells: diffusion, active transport and osmosis Chromosomes	
		<i>Zhang Yongzhen,- a virologist who agreed to post online the genome of the virus that was causing pneumonia-like illness in Wuhan, China. This led to scientists investigating the viruses key proteins, produce diagnostic test and design vaccines.</i>				<b>Biology: Ecosystems</b> Students have an understanding of how abiotic and biotic factors influence the environment around them. Students use this information to carry out a an ecology investigation. Students develop their disciplinary skills to include systematic and random sampling. Students end the unit with a focus on why plastics in the ocean is a problem and why the demand for single use plastics is going down.	

Year 9	Chemistry	Autumn 1 – 7 weeks	Autumn 2 – 7 weeks	Spring 1 – 6 weeks	Spring 2 – 5/6 weeks	Summer 1 – 5/6 weeks	Summer 2- & weeks
	Course topic	Types of reactions		Chemical Energy		Fundamental Chemistry	
	<b>Powerful/Core Knowledge</b>  <b>Including key people and stories</b>	<p>Understanding of chemical changes began when people began experimenting with chemical reactions in a systematic way and organizing their results logically. Knowing about these different chemical changes meant that scientists could begin to predict exactly what new substances would be formed and use this knowledge to develop a wide range of different materials and processes. It also helped biochemists to understand the complex reactions that take place in living organisms. The extraction of important resources from the earth makes use of the way that some elements and compounds react with each other and how easily they can be 'pulled apart'.</p> <p>Metal oxides The reactivity series Extraction of metals and reduction Reactions of acids with metals Neutralisation of acids and salt production The pH scale and neutralisation</p>		<p>Students develop their understanding of chemical reactions by looking at exothermic and endothermic reactions and energy profiles. They then look at real world applications of catalysts in industry and identify the benefits and disadvantages of them.</p>		<p>The periodic table provides chemists with a structured organisation of the known chemical elements from which they can make sense of their physical and chemical properties. The historical development of the periodic table and models of atomic structure provide good examples of how scientific ideas and explanations develop over time as new evidence emerges. The arrangement of elements in the modern periodic table can be explained in terms of atomic structure which provides evidence for the model of a nuclear atom with electrons in energy levels.</p>	

Physics	Autumn 1 – 7 weeks	Autumn 2 – 7 weeks	Spring 1 – 6 weeks	Spring 2 – 5/6 weeks	Summer 1 – 5/6 weeks	Summer 2- & weeks
<b>Course topic</b>	<b>Energy- Heating and Cooling</b>		<b>Wave interaction</b>		<b>Forces and their effects</b>	
<b>Powerful/Core Knowledge</b>  <b>Including key people and stories</b>	<p>Temperature is a measure of how hot things are and therefore their thermal energy.</p> <p>Substances will change state when the particles have enough energy to overcome the forces. Students will further develop their knowledge of how substances get warmer and cooler.</p>		<p>Waves are one of the ways in which energy may be transferred between stores. It is an oscillation or vibration that transfers energy without transferring any material. Students will learn more about the frequency and apply the equation. A focus on light waves including reflection, refraction and dispersion of light will be delivered</p>		<p>A force causes an object to undergo a specific change. Unbalanced forces cause changes in speed, shape or direction.</p> <p>Students will be able to calculate work done. Students will complete a practical linked at Hooke's Law and apply their knowledge of elastic limit to this. Students then look at pressure in fluids and how this can be used to make hydraulic machines.</p>	