

EMMANUEL COLLEGE

THE SCIENCE DEPARTMENT

Year 9



Year 9	Autumn, Half-Term 1	Autumn, Half-Term 2
Unit Title	Cells and Cell Division	Organisation and the Digestion System
Key Question(s)?	How do cells function within organisms?	How does the digestive system work?
Threshold Concepts	<p>Plant and animal cells (eukaryotic cells) have a cell membrane, cytoplasm and genetic material enclosed in a nucleus.</p> <p>Cells may be specialised to carry out a particular function.</p> <p>In mature animals, cell division is mainly restricted to repair and replacement.</p> <p>Substances may move into and out of cells across the cell membranes via diffusion.</p> <p>A stem cell is an undifferentiated cell of an organism which is capable of giving rise to many more cells of the same type.</p> <p>The nucleus of a cell contains chromosomes made of DNA molecules.</p> <p>In mitosis one set of chromosomes is pulled to each end of the cell and the nucleus divides.</p>	<p>The digestive system is an example of an organ system, where several organs work together to digest and absorb food.</p> <p>Enzymes catalyse specific reactions in living organisms due to the shape of their active site.</p> <p>Digestive enzymes convert food into small soluble molecules that can be absorbed into the bloodstream.</p>
Link to Prior Learning	Links to KS3 topic on cells in Year 7, where the structures of plant and animal cells were first introduced.	Links to the KS3 topic on Organisms 1 in Year 7, where the digestive system was first introduced. Students should therefore already know the organs of the digestive system.
	Spring, Half-Term 1	Spring, Half-Term 2
Unit Title	Non-Communicable Diseases	Communicable Diseases, Prevention and Treatment
Key Question(s)?	What are non-communicable diseases and what is their impact?	What are communicable diseases and what is their impact?
Threshold Concepts	<p>In coronary heart disease, layers of fatty material build up inside the coronary arteries, narrowing them.</p> <p>Health is the state of physical and mental well-being.</p>	<p>Communicable diseases are caused by pathogens – microorganisms that can be spread from one organism to another.</p> <p>The body has developed a range of mechanisms to defend itself from pathogens.</p>

	<p>Diseases, both communicable and non-communicable, are major causes of ill health.</p> <p>Lifestyle risk factors are linked to an increased rate of a disease.</p> <p>Cancer is the result of changes in cells that lead to uncontrolled growth and division.</p>	<p>Lifestyle can contribute to our risk of developing communicable diseases.</p> <p>If a pathogen enters the body the immune system tries to destroy the pathogen.</p> <p>Vaccination involves introducing small quantities of dead or inactive forms of a pathogen into the body to stimulate the white blood cells to produce antibodies.</p>
Link to Prior Learning	Lifestyle risk factors were first introduced in the Year 7 Organisms 1 topic without going into detail about the types of non-communicable diseases.	Microorganisms were introduced in series of Year 8 lectures that looked at food hygiene and food poisoning bacteria.
	Summer Term	
Unit Title	Adaptations	
Key Question(s)?	How do species within an ecosystem interact with each other and how are they adapted to particular conditions.	
Threshold Concepts	<p>The sun is a source of energy that passes through ecosystems. Materials including carbon and water are continually recycled by the living world, being released through respiration of animals, plants and decomposing microorganisms and taken up by plants in photosynthesis.</p> <p>All species live in ecosystems composed of complex communities of animals and plants dependent on each other and that are adapted to particular conditions.</p> <p>In order to continue to benefit from these services humans need to engage with the environment in a sustainable way.</p>	
Link to Prior Learning	This was first introduced in Year 8 in both biology topics, looking at variation and ecosystems.	
Knowledge and Sequencing Rationale	<p>A1: Cells, specialised cells and microscopy. Cells are the fundamental building block of all organisms, and knowledge of their structure and functions is required in many of the biology topics that follow. Microscopy is a practical skill that will be used throughout the rest of the course.</p> <p>A2: The digestive system as an organ system is a logical step up from cells. It introduces the key concept in biology of enzymes as a biological catalyst; a fundamental concept required in other areas of the course.</p> <p>SP1: The non-communicable disease topic could be split up and spaced throughout the course, e.g. cardiovascular disease with the study of the circulatory system, but it is placed here as part of the delivery of whole school PSHE.</p> <p>SP2: Communicable disease is required before we can go on to teach the ideas of response to disease and follows on from the study of cells (e.g. prokaryotes).</p> <p>S1: Response to disease contains more difficult concepts and could be delivered after the circulatory system topic, but it follows on from the communicable disease topic and it is a Biology Paper 1 topic.</p> <p>S2: This topic needs to be completed in the summer term so that the practical work can take place outdoors when plants are flowering. It could be done in Year 10, but it is a simple topic conceptually and is more suitable for Year 9 students (it is a Paper 2 topic, however).</p>	