

# Long Term Plan: Biology Year 9

**“Science is simply the word we use to describe a method of organising our curiosity.”**

The programme for years 7 – 11 has staff teaching a single class, with rotating topics/subjects. There is varied order of topics for classes to allow for the rotation of practical equipment. Students will complete a biology, chemistry and then physics topic followed by an assessment. This process will then repeat again.

Staff are to use the [Curriculum Road Map](#) in the Science Drive to ensure that they rotate at the appropriate times.

Topic	Unit title	Key knowledge/ Content to learn and retain	Essential skills to acquire (subject & generic)	Anticipated misconceptions	Links to previous KS	Links to future KS	Opportunity for stretch for high prior attainers
One	Cells	<p>Prokaryotic compared to eukaryotic cells</p> <p>Microscopy</p> <p>The cell cycle, although details of the stages of mitosis is not required</p> <p>The use of stem cells and the ethical aspects of stem cell use</p> <p>Culturing Microorganisms (Triple Only)</p> <p>Diffusion and osmosis, including investigating cell concentrations using osmosis and active transport</p> <p>The need for exchange surfaces and the human respiratory system</p>	<p>Drawing and labelling scientific diagrams</p> <p>Changing the subject of, and substituting into, simple equations with three terms</p> <p>Extended writing</p> <p>Carry out practical investigation and record accurate data</p> <p>Recording and interpreting data in tabular and graphical form</p>	<p>That all animal cells look like the model animal cell often used to teach this topic, teaching must be careful that students understand that most animal cells are specialised</p> <p>That people grow as their cells get bigger as opposed to replication of cells</p> <p>Potential for confusion between osmosis and diffusion</p>	<p>A key stage three students to study the basic structure from animal plant and bacterial cells, including the function of most organelles</p> <p>At key stage three students studied cell specialisation</p> <p>Students carried out some basic work with microscopy at key stage three</p>	<p>The cell as the fundamental unit of life is studied in both applied human biology and A-level biology</p> <p>Both courses also include study of mitosis</p> <p>At A-level this will be extended to look at explaining cell differentiation, comparing yourself to viruses, and to comparing light and electron microscopy</p> <p>In the applied</p>	<p>Students to compare stem cells extracted from bone marrow and from embryos, looking at which kind of cells these can differentiate into and considering why</p> <p>High Prior attainers can attempt to draw the osmosis graph without scaffolding</p> <p>Higher Prior attainers can look in more detail at the lock and key model of the enzyme and consider the induced fit model.</p> <p>The use of enzymes in biological cleaning</p>

						human biology course students will look at the cellular response to injury and stress including hypertrophy and hyperplasia	agents  How and why the enzymes from different organisms have different optimal conditions
<b>SMSC &amp; British Values</b>	The ethics surrounding the use of stem cells in medical research and in the treatment of certain diseases such as dementia						
<b>Cultural Capital</b>	Students explore the ethical issues surrounding use stem cells, including why different people may hold different views on their use						
<b>Career Link</b>	As cells are fundamental to biology this unit opens doors to careers in any biological medical or ecological field						
Two	Organisation	<p>Construction of multicellular organism from cells – organ systems</p> <p>The simple lock and key model of enzymes</p> <p>Factors that affect the rate of an enzyme-controlled reaction and the concept of enzyme denaturation</p> <p>The physiology and anatomy of the human digestive system and the function of enzymes in the digestive system</p> <p>Testing for key nutrient groups using simple chemical tests</p> <p>Gas exchange in humans, transport with the circulatory</p>	<p>Drawing and labelling scientific diagrams</p> <p>Safety carry out scientific investigation using live samples, recording accurate data and represent information on a graph</p> <p>Opportunity for extended writing</p>	<p>That enzymes can “die” or are killed; rather than denatured.</p> <p>That digestion starts in the stomach; when it actually starts in the mouth</p> <p>That digestion releases energy from food - rather than breaks down food into smaller molecules</p> <p>The concept of plants “breathing” &amp; carrying our respiration</p> <p>That human blood is blue when deoxygenated</p> <p>Potential for confusion between the functions of the xylem and the phloem</p>	<p>The year three program of study includes plants and what plants need in order to grow, also builds on the interdependence unit studied in year eight</p> <p>Developed further study of circulatory and respiratory system from year eight</p> <p>The year three program of study includes plants and what plants need in order to grow, also builds on the</p>	<p>Lays the foundation for study of the organisation unit at A Level</p> <p>Study of bioenergetics and factors affecting photosynthesis</p> <p>GCSE required practical: The use of osmosis to determine the sucrose concentration of potato cells</p> <p>GCSE required practical: Food</p>	<p>Adaptation of the respiratory system, including adaptations of alveoli to increase the rate of diffusion</p> <p>Comparison of factors affecting Transpiration</p> <p>Drawing of tangents on curves to establish gradients</p> <p>Comparing lung structure in humans with the gas exchange systems of other animals (e.g., fish)</p> <p>Comparing the</p>

		<p>system.</p> <p>The heart and circulatory system, including coronary heart disease</p> <p>The difference between communicable and non-communicable diseases, including an overview of cancer</p> <p>The organisation of cells in plants</p> <p>Gas exchange in plants, transport with the xylem and phloem, including an investigation of factors affecting transpiration</p>		Potential for confusion between transpiration and translocation	interdependence unit studied in year eight	<p>Tests</p> <p>Study of bioenergetics and factors affecting photosynthesis</p>	structure of the circulatory system in humans with that of other animals (e.g., fish, worms, molluscs, insects etc.)
<b>SMSC &amp; British Values</b>	<p>Risk factors for coronary heart disease</p> <p>The risks and impact of smoking on the human respiratory system</p> <p>Delicate balance that exists between the existence of plants and animals</p> <p>Diseases across the world</p>						
<b>Cultural Capital</b>	<p>Pandemics through time</p> <p>Current global health issues</p>						
<b>Career Link</b>	<p>Dietician</p> <p>Nutritionist</p> <p>Sport science</p> <p>Food scientist</p>						
Three	Bioenergetics (Part 1)	<p>Photosynthesis, including the world and symbol equation.</p> <p>Factors that affect the rate of photosynthesis</p> <p>How plants use glucose</p>	<p>writing and balancing chemical equations</p> <p>Graphing data, and interpreting data presented in graphical form</p> <p>Drawing and extrapolating lines of best fit</p>	<p>That plants breathe</p> <p>Students may struggle to link the factors that affect the rate of photosynthesis to the factors that affect the rate of an enzyme controlled</p>	The year three program of study includes learning that plants and make their own food, although students will not have used the term	<p>The study of bioenergetics at GCSE</p> <p>How plant structures are adapted for photosynthesis</p>	Students could consider how The optimal conditions for photosynthesis might differ for plants that live in different environments and

					photosynthesis Students were introduced to the idea of photosynthesis in year eight when they look at plants as the foundation of the most food chains	GCSE required practical: investigate the effect of one named variable on the rate of photosynthesis	how this could be achieved biologically Students could link photosynthesis and respiration as part of a wider nutrient cycle
<b>SMSC &amp; British Values</b>	Plants as fundamental to human existence, forming the basis of food chains which support us. Delicate balance that exists between the existence of plants and animals						
<b>Cultural Capital</b>	Production of food to support the world's growing population						
<b>Career Link</b>	Conservationist Botanist Farming Food scientist						
Four	Bioenergetics (Part 2)	Aerobic and anaerobic respiration, including word and symbol equations  The effects of exercise on the rate of respiration, with reference to heart and breathing rate  Bodily metabolism	writing and balancing chemical equations  Graphing data, and interpreting data presented in graphical form  Drawing and extrapolating lines of best fit	Confusion between the term respiration and the act of breathing, which should be referred to with the term ventilation	The year three program of study includes learning that plants and make their own food, although students will not have used the term photosynthesis  Students were introduced to the idea of photosynthesis in year eight when they look at plants as the foundation of the most food chains	The study of bioenergetics at GCSE  How plant structures are adapted for photosynthesis  GCSE required practical: investigate the effect of one named variable on the rate of photosynthesis	Students could consider how The optimal conditions for photosynthesis might differ for plants that live in different environments and how this could be achieved biologically  Students could link photosynthesis and respiration as part of a wider nutrient cycle

<b>SMSC &amp; British Values</b>	The effects of exercise on the body, and why it is important that you are regularly physically active
<b>Cultural Capital</b>	The correct meaning of the term metabolism which is often misused in popular culture Leading healthy lifestyles – how easy is this to achieve for all global communities?
<b>Career Link</b>	Sports coaching Physiotherapy Conservationist Botanist Farming Food scientist