

Curriculum Map Year 11 Combined Science – Biology

Topic Name		Scientific Skills	Essential Knowledge (misconceptions or really tricky bits are underlined)	Prior Learning (KS3)	Assessment	Link to future learning
Ecology Part 1	Autumn HT1 (approx.9 lessons)	<p>In this topic I can:</p> <p>measure the population size of a common species in a habitat. Use sampling techniques to investigate the effect of a factor on the distribution of this species.</p> <ul style="list-style-type: none"> AT skills covered by this practical activity: biology AT 1, 3, 4 and 6. <p>understand the terms mean, mode and median calculate arithmetic means plot and draw appropriate graphs selecting appropriate scales for the axes.</p> <p>interpret graphs used to model predator-prey cycles.</p> <p>interpret evolutionary trees.</p>	<p>In this topic I will know:</p> <p>Key terms used in the topic such as environment, habitat, population, community, ecosystem, organisms, species, interdependence, stable community, abiotic, biotic, producer, consumer.</p> <p>describe: different levels of organisation in an ecosystem from individual organisms to the whole ecosystem <u>the importance of interdependence and competition in a community</u></p> <p>Plants in a community or habitat often compete with each other for light and space, and for water and mineral ions from the soil.</p> <p>Animals often compete with each other for food, mates and territory.</p> <p>How a change in an abiotic factor would affect a given community given appropriate data or context.</p> <p>How a change in a biotic factor might affect a given community given appropriate data or context.</p> <p>How organisms are adapted to live in their natural environment, given appropriate information. . These adaptations may be structural, behavioural or functional.</p> <p>Some organisms live in environments that are very extreme, such as at high temperature, pressure, or salt concentration. These organisms are called extremophiles. Bacteria living in deep sea vents are extremophiles.</p> <p>All food chains begin with a producer which synthesises molecules. This is usually a green plant or alga which makes glucose by photosynthesis.</p> <p>Linnaeus classified living things into kingdom, phylum, class, order, family, genus and species. Organisms are named by the binomial system of genus and species.</p> <p>Due to evidence available from chemical analysis there is now a 'three-domain system' developed by Carl Woese. In this system organisms are divided into: Archaea (primitive bacteria usually living in extreme environments)</p>	Before I start this topic, I need to know:	<p>Knowledge and skills will be assessed by:</p> <p>The topics highlight in BLUE will be assessed in the topic booklet. This will be looking at the quality of practical work and any methods/graphs or tables produced. They may also be reassessed in the end of topic tests where appropriate.</p> <p>The topics highlighted in GREEN will be assessed through questions during the end of topic assessment.</p>	Links to AS biology Links to the movement of sugar into the body when studying the role of insulin in the homeostasis topic in year 11.

			<p>Bacteria (true bacteria) Eukaryota (which includes protists, fungi, plants and animals).</p>			
<p>Genetics, inheritance and Evolution</p>	<p><i>Autumn HT2</i> <i>And start of HT3</i> <i>(approx.9 lessons)</i></p>	<p>(HT only) Students should be able to construct a genetic cross by Punnett square diagram and use it to make predictions using the theory of probability.</p> <p>WS 1.2 Use the theory of evolution by natural selection in an explanation.</p> <p>MS 2c, 4a Extract and interpret information from charts, graphs and tables.</p>	<p>In this topic I will know how to: The difference between sexual and asexual reproduction Stages in meiosis to include: When a cell divides to form gametes: copies of the genetic information are made the cell divides twice to form four gametes, each with a single set of chromosomes all gametes are genetically different from each other Compare mitosis and meiosis Recall the genetic terms gamete, chromosome, gene, DNA, allele, dominant, recessive, homozygous, heterozygous, phenotype, genotype, mutation.</p> <p>Students should be able to complete a Punnett square diagram and extract and interpret information from genetic crosses and family trees.</p> <p>Recall the genetic disease, cystic fibrosis and polydactyly and know how they are caused.</p> <p>Students should make informed judgements about the economic, social and ethical issues concerning embryo screening, given appropriate information</p> <p>Students should to be able to carry out a genetic cross to show sex inheritance.</p> <p>Differences in the characteristics of individuals in a population is called variation and may be due to differences in: • the genes they have inherited (genetic causes) • the conditions in which they have developed (environmental causes) • a combination of genes and the environment.</p> <p>describe evolution as a change in the inherited characteristics of a population over time through a process of natural selection which may result in the formation of a new species.</p> <p>Data is now available to support the theory of evolution.</p>	<p>Before I start this topic, I need to know:</p>	<p>Knowledge and skills will be assessed by:</p> <p>The topics highlight in BLUE will be assessed in the topic booklet. This will be looking at the quality of practical work and any methods/graphs or tables produced. They may also be reassessed in the end of topic tests where appropriate.</p> <p>The topics highlighted in GREEN will be assessed through questions during the end of topic assessment.</p>	

			<p>Fossils are the 'remains' of organisms from millions of years ago, which are found in rocks. Appreciate why the fossil record is incomplete.</p> <p>Extinctions occur when there are no remaining individuals of a species still alive. Students should be able to describe factors which may contribute to the extinction of a species.</p> <p>Explain the benefits and risks of selective breeding given appropriate information and consider related ethical issues.</p>			
Homeostasis	Spring HT3 and 4 (approx.7 lessons)		•		<p>The topics highlight in BLUE will be assessed in the topic booklet. This will be looking at the quality of practical work and any methods/graphs or tables produced. They may also be reassessed in the end of topic tests where appropriate.</p> <p>The topics highlighted in GREEN will be assessed through questions during the end of topic assessment.</p> <p>At the end of this unit is a full syntopic test that will assess all skills gathered so far in the 'green' and 'blue' sections.</p>	

<p>Ecology Part 2</p>	<p><i>Spring HT4 (approx.9 lessons)</i></p>	<p>Demonstrating that I can:</p> <p>WS 1.3 Evaluate methods of treatment bearing in mind the benefits and risks associated with the treatment.</p> <p>WS 1.5 Interpret data about risk factors for specified diseases.</p> <ul style="list-style-type: none"> Students should be able to use a scatter diagram to identify a correlation between two variables in terms of risk factors. <p>Observe and draw the heart during a dissection. Identify the 4 major blood vessels and chambers when viewing a pigs / lambs heart.</p>	<p>In this topic I must know:</p> <ul style="list-style-type: none"> The structure and functioning of the human heart and lungs, including how lungs are adapted for gaseous exchange. Knowledge of the blood vessels associated with the heart is limited to the aorta, vena cava, pulmonary artery, pulmonary vein and coronary arteries. <p>Knowledge of the lungs is restricted to the trachea, bronchi, alveoli and the capillary network surrounding the alveoli.</p> <p>explain how the structure of these vessels (arteries, veins and capillaries) relates to their functions.</p> <p>functions of each of these blood components</p> <p><u>Evaluate the advantages and disadvantages of treating cardiovascular diseases by drugs, mechanical devices or transplant.</u></p>	<p>Before I start this topic, I must know:</p>	<p>Knowledge and skills will be assessed by:</p> <p>The topics highlight in BLUE will be assessed in the topic booklet. This will be looking at the quality of practical work and any methods/graphs or tables produced. They may also be reassessed in the end of topic tests where appropriate.</p> <p>The topics highlighted in GREEN will be assessed through questions during the end of topic assessment.</p>	
<p>Organisation, The Human Digestive System</p>	<p><i>Summer HT5</i></p>	<p>Use qualitative reagents to test for a range of carbohydrates, lipids and proteins. To include: Benedict's test for sugars; iodine test for starch; and Biuret reagent for protein.</p> <ul style="list-style-type: none"> AT 2 – safe use of a Bunsen burner and a boiling water bath. AT 8 – use of qualitative reagents to identify biological molecules. <p>Investigate the effect of pH on the rate of reaction of amylase enzyme.</p> <ul style="list-style-type: none"> AT 1 – use appropriate apparatus to record the volumes of liquids, time and pH. AT 2 – safe use of a water bath or electric heater. 	<ul style="list-style-type: none"> Students should be able to use the 'lock and key theory' as a simplified model to explain enzyme action. Students should be able to recall the sites of production and the action of amylase, proteases and lipases. Students should be able to understand simple word equations but no chemical symbol equations are required. Digestive enzymes convert food into small soluble molecules that can be absorbed into the bloodstream. Carbohydrases break down carbohydrates to simple sugars. Amylase is a carbohydrase which breaks down starch. Proteases break down proteins to amino acids. Lipases break down lipids (fats) to glycerol and fatty acids. The products of digestion are used to build new carbohydrates, lipids and proteins. Some glucose is used in respiration. Bile is made in the liver and stored in the gall bladder. It is alkaline to neutralise hydrochloric acid from the stomach. <u>It also emulsifies fat to form small droplets which increases the</u> 		<p>The topics highlight in BLUE will be assessed in the topic booklet. This will be looking at the quality of practical work and any methods/graphs or tables produced. They may also be reassessed in the end of topic tests where appropriate.</p> <p>The topics highlighted in GREEN will be assessed through questions during the end of topic assessment.</p>	

		<ul style="list-style-type: none"> • AT 5 – measure the rate of reaction by the colour change of iodine indicator. • AT 8 – use of qualitative iodine reagent to identify starch by continuous sampling • WS 2.6 – make and record observations and measurements of time. • WS 3.1 – present a graph of amylase activity against pH. • WS 3.2 – translate numeric data into graphical form. • MS 1a, 1c – carry out rate calculations for chemical reactions. 	<p><u>surface area. The alkaline conditions and large surface area increase the rate of fat breakdown by lipase.</u></p>			
Examination period and Bioenergetics	Summer HT6	<p>AT 1, 3, 4 Investigations into the effect of exercise on the body.</p> <p>Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.</p> <ul style="list-style-type: none"> • AT 1 – use appropriate apparatus to record the rate of production of oxygen gas produced; and to measure and control the temperature of water in a large beaker that acts as a ‘heat shield’. • AT 2 – use a thermometer to measure and control temperature of water bath. • AT 3 – use appropriate apparatus and techniques to observe and measure the process of oxygen gas production. • AT 4 – safe and ethical use and disposal of living pondweed to measure 	<p>In this topic I must know: How to describe photosynthesis as an endothermic reaction in which energy is transferred from the environment to the chloroplasts by light.</p> <p>Explain the effects of temperature, light intensity, carbon dioxide concentration, and the amount of chlorophyll on the rate of photosynthesis.</p> <p>extract and interpret graphs of photosynthesis rate involving one limiting factor plot and draw appropriate graphs selecting appropriate scale for axes</p> <p>translate information between graphical and numeric form.</p> <p>Should know five ways glucose produce in photosynthesis is used in a plant.</p> <p>describe cellular respiration as an exothermic reaction which is continuously occurring in living cells</p> <p>to compare the processes of aerobic and anaerobic respiration with regard to the need for oxygen, the differing products and the relative amounts of energy transferred.</p> <p>Students should recognise the word equations for photosynthesis and respiration/</p>		<p>The topics highlight in BLUE will be assessed in the topic booklet. This will be looking at the quality of practical work and any methods/graphs or tables produced. They may also be reassessed in the end of topic tests where appropriate.</p> <p>The topics highlighted in GREEN will be assessed through questions during the end of topic assessment.</p> <p>End of Year synoptic assessment that will cover as many of the key skills and green facts as time allows.</p>	

		<p>physiological functions and responses to light.</p> <ul style="list-style-type: none">• AT 5 – measuring rate of reaction by oxygen gas production.	<p>Explain how the human body reacts to in increased demand for energy during exercise.</p> <p>explain the importance of sugars, amino acids, fatty acids and glycerol in the synthesis and breakdown of carbohydrates, proteins and lipids.</p> <p>Define the term metabolism</p>			
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