



Topic name	Term	Skills developed	Link to NC subject content	Prior learning	Next link in curriculum
3.7 Genetics, populations, evolution and ecosystems	Summer Term Year 12 and Autumn Term Year 13	<p>3.7.4 Populations in ecosystems AT k Students could:</p> <ul style="list-style-type: none"> investigate the distribution of organisms in a named habitat using randomly placed frame quadrats, or a belt transect use both percentage cover and frequency as measures of abundance of a sessile species. <p>AT h Students could use the mark-release-recapture method to investigate the abundance of a motile species.</p> <p>AT i Students could use turbidity measurements to investigate the growth rate of a broth culture of microorganisms.</p> <p>MS 2.5 Students could use a logarithmic scale in representing the growth of a population of microorganisms.</p>	<p>3.7 Genetics, populations, evolution and ecosystems (A-level only).</p> <p>3.7.4 Populations in ecosystems Populations of different species live in communities. Competition occurs within and between these populations for the means of survival. Within a single community, one population is affected by other populations, the biotic factors, in its environment. Populations within communities are also affected by, and in turn affect, the abiotic (physicochemical) factors in an ecosystem.</p>	<p>Links from AS:</p> <p>3.4.4 Genetic diversity and adaptation 3.4.5 Species and taxonomy 3.4.6 Biodiversity within a community 3.4.7 Investigating diversity</p> <p>Links from GCSE:</p> <p>KS4 YEAR 11 4.7.1 Adaptations, interdependence and competition. 4.7.3 Biodiversity and the effect of human interaction on ecosystems.</p>	N/A
3.5 Energy transfers in and between organisms (A-Level only).	Autumn Term Year 13	<p>3.5 Energy transfers in and between organisms MS 0.1 Students could be given data from which to calculate gross primary production and to derive the appropriate units. AT</p>	<p>3.5 Energy transfers in and between organisms</p> <p>3.5.3 Energy and ecosystems Life depends on continuous transfers of energy. In communities, the</p>	<p>Links from AS</p> <p>3.1 Biological molecules</p> <p>Links from GCSE:</p> <p>KS4 YEAR 11</p>	N/A



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		<p>a Students could carry out investigations to find the dry mass of plant samples or the energy released by samples of plant biomass.</p> <p>MS 2.4 Students could be given data from which to calculate:</p> <ul style="list-style-type: none"> the net productivity of producers or consumers from given data the efficiency of energy transfers within ecosystems. <p>MS 0.3 Students could be given data from which to calculate percentage yields.</p> <p>PS 1.1 Students could devise investigations into the effect of named minerals on plant growth.</p>	<p>biological molecules produced by photosynthesis are consumed by other organisms, including animals, bacteria and fungi. Some of these are used as respiratory substrates by these consumers. Photosynthesis and respiration are not 100% efficient. The transfer of biomass and its stored chemical energy in a community from one organism to a consumer is also not 100% efficient.</p> <p>3.5.4 Nutrient Cycles Nitrogen and Phosphorus are essential for life. The cycling of these materials is important to ensure organisms have the essential biological molecules to survive.</p>	<p>4.7.2 Organisation of an ecosystem 4.7.4 Trophic levels in an ecosystem 4.7.5 Food production</p>	
3.6. Organisms respond to changes in their internal and external environments (A-Level only)	Autumn and Spring Terms Year 13	<p>AT h Students could design and carry out investigations into the effects of indoleacetic acid on root growth in seedlings.</p> <p>Required practical 10: Investigation into the effect of an environmental variable on the movement of an animal using either a choice chamber or a maze. AT h</p> <p>AT h Students could design and carry out investigations into:</p>	<p>3.6 Organisms respond to changes in their internal and external environments (A-level only). A stimulus is a change in the internal or external environment. A receptor detects a stimulus. A coordinator formulates a suitable response to a stimulus. An effector produces a response. Receptors are specific to one type of stimulus. Nerve cells pass electrical impulses along their length. A nerve impulse is specific to a target cell only because it releases a chemical</p>	<p>Links from AS 3.3.4 Mass transport in animals</p> <p>Links from GCSE: KS4 YEAR 11 4.5.1 Homeostasis 4.5.2 The human nervous system 4.5.3 Hormonal control in humans 4.5.4 Plant hormones</p>	N/A



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		<ul style="list-style-type: none"> • the sensitivity of temperature receptors in human skin • habituation of touch receptors in human skin • resolution of touch receptors in human skin. <p>AT h Students could design and carry out an investigation into the effect of a named variable on human pulse rate.</p> <p>MS 2.2 Students could use values of heart rate (R) and stroke volume (V) to calculate cardiac output (CO), using the formula $CO = R \times V$</p> <p>MS 0.2 Students could use appropriate units when calculating the maximum frequency of impulse conduction given the refractory period of a neurone.</p> <p>AT d Students could examine prepared slides of skeletal muscle using an optical microscope.</p> <p>AT h Students could investigate the effect of repeated muscular contraction on the rate of muscle fatigue in human volunteers.</p>	<p>messenger directly onto it, producing a response that is usually rapid, short-lived and localised.</p> <p>In contrast, mammalian hormones stimulate their target cells via the blood system. They are specific to the tertiary structure of receptors on their target cells and produce responses that are usually slow, long-lasting and widespread. Plants control their response using hormone-like growth substances.</p> <p>3.6.1 Stimuli, both internal and external, are detected and lead to a response.</p> <p>3.6.1.1 Survival and response</p> <p>3.6.1.2 Receptors</p> <p>3.6.1.3 Control of heart rate</p> <p>3.6.2 Nervous coordination</p> <p>3.6.2.1 Nerve impulses</p> <p>3.6.2.2 Synaptic transmission</p> <p>3.6.3 Skeletal muscles are stimulated to contract by nerves and act as effectors.</p> <p>3.6.4 Homeostasis is the maintenance of a stable internal environment.</p> <p>3.6.4.1 Principles of homeostasis and negative feedback</p> <p>3.6.4.1 Control of blood glucose concentration</p> <p>3.6.4.3 Control of blood water potential</p>		



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