

Biology Year 11 Curriculum Overview 2023-24

Blue = Higher science content only

Yellow = Triple science content only

	Autumn		Spring		
	Learning Cycle 1	Learning Cycle 2	Learning Cycle 3	Learning Cycle 4	Learning Cycle 5
Topic	Biodiversity	Homeostasis	Inheritance and variation	Inheritance and variation	Variation and evolution
Critical Prior Knowledge	Y8 Ecology Y10 Ecology and biodiversity	Y7 Reproduction and Y9 Cells Y10 Respiration	Y8 Inheritance Y8 Genetics	Y8 Inheritance Y8 Genetics	Y8 Genetics Y8 Classification and adaptation Y10 Adaptation
Overall Intent (Big ideas and key concepts)	Global warming and the impact of environment change Biodiversity, deforestation and the management of diversity. Land use and waste, management. Farming techniques, including sustainable fisheries, and the role of biotechnology Food security. Communities and their interaction with abiotic factors and biotic factors Adaptations of organisms in different environments and	Homeostasis and the control of blood glucose concentration, maintaining water and nitrogen balance and the principle of negative feed back Human nervous system, including the brain, eye, control of body temperature, The endocrine system Plant hormones in coordination and their uses	DNA and the genome, DNA structure and protein synthesis, monohybrid inheritance and, inherited disorders, determination of sex, and history of genetics.	DNA and the genome, DNA structure and protein synthesis, monohybrid inheritance and, inherited disorders, determination of sex, and history of genetics.	Variation and the process of evolution and selective breeding and the development of antibiotic resistant bacteria. Genetic engineering, Cloning, Theory of evolution and speciation, Evidence for evolution, including Fossils Extinction Classification of living organisms

	<p>feeding relationships, including tropic levels Pyramids of biomass and transfer of biomass</p>				
<p>Essential Knowledge milestones (What students must master)</p>	<p>To be able to define biodiversity To be able to describe activities that reduce biodiversity. To be able to describe why more waste is being produced.</p> <p>To be able to describe different types of pollution. To be able to list the human activities that reduce land availability.</p> <p>To be able to outline with problems associated with the destruction of peat bogs.</p> <p>To be able to describe the reasons for deforestation.</p> <p>To be able to define global warming.</p> <p>To be able to describe some of the biological consequences of global warming.</p> <p>To be able to describe both positive and negative human interactions in an ecosystem and explain their impact on biodiversity.</p> <p>To be able to list examples of programmes put in place to reduce the negative effects of humans on ecosystems and biodiversity.</p> <p>To recall the key vocabulary used when planning investigations.</p>	<p>Define what homeostasis is</p> <p>Describe the components of the main automatic control systems</p> <p>Explain using examples how homeostasis maintains optimal conditions.</p> <p>Describe how the structure of the nervous system is adapted to its function</p> <p>Describe the process by which our body reacts to its surroundings</p> <p>Explain how the CNS coordinates responses Be able to identify anomalies and calculate mean values</p> <p>Describe how to improve an experiment</p> <p>Explain how to improve an experiment with reference to accuracy, reliability, precision and repeatability.</p> <p>Identify the main areas of the brain</p> <p>Describe the function of the main areas of the brain</p> <p>Describe how scientists determine the structure and function of the brain</p> <p>Identify the main parts of the human eye</p> <p>Describe how the structures are related to their functions</p> <p>Explain how the eye focuses light Explain how the eye focuses on near and distant objects</p>	<p>To know what sexual and asexual reproduction are.</p> <p>To be able to outline the key features of sexual and asexual reproduction.</p> <p>To be able to outline meiosis and explain its importance in sexual reproduction.</p> <p>To be able to outline the advantages of sexual and asexual reproduction.</p> <p>To be able to give named examples of organisms that can reproduce both sexually and asexually.</p> <p>To know how genetic material is organised in the nucleus.</p> <p>To understand the relationship between the cells genetic material and the protein that it makes.</p> <p>To know what the human genome is and the potential benefits of having 'read' it. Be able to give a detailed description of the structure of DNA.</p> <p>To be able to outline how DNA codes for a protein.</p>	<p>To know what sexual and asexual reproduction are.</p> <p>To be able to outline the key features of sexual and asexual reproduction.</p> <p>To be able to outline meiosis and explain its importance in sexual reproduction.</p> <p>To be able to outline the advantages of sexual and asexual reproduction.</p> <p>To be able to give named examples of organisms that can reproduce both sexually and asexually.</p> <p>To know how genetic material is organised in the nucleus.</p> <p>To understand the relationship between the cells genetic material and the protein that it makes.</p> <p>To know what the human genome is and the potential benefits of having 'read' it. Be able to give a detailed description of the structure of DNA.</p> <p>To be able to outline how DNA codes for a protein.</p>	<p>To understand why plants and animals have similar characteristics to their parents and how environment influences this.</p> <p>Know that information is passed on by genes in the gametes.</p> <p>To understand that variation is caused by mutations.</p> <p>To understand the significance of Mendel's work</p> <p>To appreciate why his work was not recognised until after his death.</p> <p>To understand the theory of natural selection</p> <p>To be able to explain how new species are formed</p> <p>Understand what evolution is and two different theories surrounding it</p>

	<p>To Plan an investigation into the effect of temperature on the rate of decay of milk.</p> <p>To produce a suitable results table.</p> <p>To set up the investigation.</p> <p>To know the factors that affect the rate of decay.</p> <p>To understand how we make use of both aerobic and anaerobic decay.</p> <p>To be able to calculate the rate of decay.</p> <p>To be able to state what food security is.</p> <p>To be able to describe and explain the factors that threaten food security.</p> <p>To be able to explain how the efficiency of food production can be improved.</p> <p>To be able to evaluate choices that improve food production efficiency.</p> <p>To be able to describe and explain measures that can be taken to improve the sustainability of fisheries.</p> <p>To be able to describe how genetic modification can be used to improve food security, giving the named example of golden rice.</p> <p>To be able to describe how biotechnology can be used to improve food security, giving the named example of Fusarium.</p>	<p>Explain the cause of long and short sightedness (Myopia and Hyperopia) and how they can be resolved</p> <p>Explain how the body monitors its temperature</p> <p>Explain how the body maintains a constant temperature regardless of the external conditions.</p> <p>Students can locate and describe the endocrine system as a group of glands that secrete hormones under the overall control of the pituitary or master gland. They can give examples.</p> <p>Describe hormones as chemical control that affects specific target organs.</p> <p>Students can compare this system to the nervous system.</p> <p>Students can describe how glucose levels are maintained with references to the roles of the pancreas, the liver, glycogen and insulin.</p> <p>Students can distinguish between type 1 and type 2 diabetes with reference to what is wrong, treatment required, symptoms and risk factors.</p> <p>Students can extract information and interpret data from graphs showing the effect of insulin on blood glucose levels in people with and without diabetes.</p> <p>Higher tier students can describe and explain the role of glucagon. They should explain how glucagon interacts with insulin in a negative feedback cycle.</p> <p>Students can explain the role of adrenalin in the body in regard to the fight or flight response.</p>	<p>To be able to outline the consequences of mutation and relate this to enzyme structure.</p> <p>To understand that not all DNA is 'coding' and to be able to explain the function of the non coding sections.</p> <p>To be able define the key terms for the topic.</p> <p>Understand how dominant and recessive alleles can affect phenotypes.</p> <p>Give examples of features determined by a single gene.</p> <p>Understand that most characteristics are coded for by multiple genes.</p> <p>Be able to use the idea of probability to predict the outcome of a genetic cross involving just one gene.</p> <p>Be able to carry out a genetic cross (HT) or complete a genetic cross (FT) in a punnet square and give ratios of the outcome.</p> <p>To understand what family trees show us.</p> <p>Be able to explain patterns of inheritance for polydactyly and cystic fibrosis.</p>	<p>To be able to outline the consequences of mutation and relate this to enzyme structure.</p> <p>To understand that not all DNA is 'coding' and to be able to explain the function of the non coding sections.</p> <p>To be able define the key terms for the topic.</p> <p>Understand how dominant and recessive alleles can affect phenotypes.</p> <p>Give examples of features determined by a single gene.</p> <p>Understand that most characteristics are coded for by multiple genes.</p> <p>Be able to use the idea of probability to predict the outcome of a genetic cross involving just one gene.</p> <p>Be able to carry out a genetic cross (HT) or complete a genetic cross (FT) in a punnet square and give ratios of the outcome.</p> <p>To understand what family trees show us.</p> <p>Be able to explain patterns of inheritance for polydactyly and cystic fibrosis.</p> <p>To be able to evaluate the use of embryo screening.</p> <p>To be able to carry out genetic crosses to show the inheritance of sex</p>	<p>Compare Lamarck and Darwins theories</p> <p>Understand the importance of natural selection</p> <p>Students should be able to describe the evidence for evolution</p> <p>Students should be able to explain why the fossil record is incomplete.</p> <p>Why extinction occurs.</p> <p>To be able to describe how resistant bacteria arise.</p> <p>To be able to give MRSA as an example of a resistant bacteria.</p> <p>To be able to list the causes for the rise in antibiotic resistance.</p> <p>To be able to explain how we can reduce the rate of development of antibiotic resistant strains of bacteria.</p> <p>To be able to state why we don't have new antibiotics.</p> <p>Describe the work of Wallace in relation to Natural selection and speciation.</p> <p>To be able to explain the process and stages of speciation.</p>
--	---	---	---	--	--

		<p>Students can explain the role of thyroxine in the body in regard to growth and development.</p> <p>They can describe the control of thyroxine as a negative feedback loop.</p> <p>Students revisit osmosis and associated definitions. They apply knowledge to a new context.</p> <p>Students describe/explain loss of waste from the body to included water, carbon dioxide, mineral ions and urea. Students explain digestion of proteins results in excess amino acids and the role of the liver in safe excretion.</p> <p>Students should be able to describe the function of kidneys in maintaining the water and nitrogen balance of the body</p> <p>Students describe the function of kidneys in maintaining the water balance of the body and producing urine by filtration of the blood and selective reabsorption of useful substances such as glucose, some ions and water.</p> <p>Students can translate tables and bar charts of glucose, ions and urea before and after filtration.</p> <p>Students describe the effect of ADH on the permeability of the kidney tubules.</p> <p>Students describe how ADH creates a negative feedback loop.</p> <p>Students describe how dialysis works and compare its pros and cons to transplant.</p> <p>Students can describe the secondary sexual characteristics caused by oestrogen in girls and testosterone in boys.</p> <p>Students can describe the menstrual cycle giving the roles of FSH, LH, oestrogen and progesterone.</p>	<p>To be able to evaluate the use of embryo screening.</p> <p>To be able to carry out genetic crosses to show the inheritance of sex</p>		<p>To be able to describe the classification system put forward by Carl Linnaeus based on the structure and characteristics of living things; kingdom, phylum, class, order, family, genus and species.</p> <p>To be able to describe the impact of developments in biology on classification systems.</p> <p>To be able to explain the three-domain system developed by Carl Woese; archaea, bacteria, eukaryote.</p> <p>To be able to interpret evolutionary trees.</p> <p>Students should be able to explain the benefits of selective breeding in crops, domestic animals and plants.</p> <p>Students can explain the process of selective breeding.</p> <p>Be able to explain the stages involved in Genetically Modifying an organism.</p> <p>Be able to explain why people have concerns over GM organisms.</p> <p>Be able to give example or plants and animals that have been GM.</p>
--	--	---	--	--	--

		<p>H Tier students must be able to explain the interactions between the hormones during the menstrual cycle.</p> <p>H Tier Students should be able to extract and interpret data from graphs showing hormone levels during the menstrual cycle.</p> <p>Students can describe how hormonal and non hormonal methods prevent pregnancy to include oral, implants, injections, barrier methods, IUD, spermicidal agents, abstinence, and surgery.</p> <p>Students evaluate the different methods. Students can list the causes of infertility.</p> <p>Students can explain the use of hormones to treat infertility.</p> <p>Students can explain the steps involved in IVF and evaluate the pros and cons of this treatment.</p> <p>Describe how plants respond to light and gravity.</p> <p>Explain the mechanism of auxins in plant responses.</p> <p>Set up required practical 8 to investigate the effect of light on the growth of newly germinated seedlings.</p> <p>Describe the uses for plant hormones in agriculture and horticulture</p>			<p>Students can explain the process of cloning via:</p> <ul style="list-style-type: none"> • Cuttings • Tissue culture • Embryo transplant <p>Adult cell cloning</p>
Cultural Capital	Practical techniques, health and safety, development of fine motor and dexterity skills (all sciences)	Practical techniques, health and safety, development of fine motor and dexterity skills (all sciences) Communication of use of contraception and fertility treatments.	Communication of Science ideas and concepts (all sciences)	Communication of Science ideas and concepts (all sciences)	Selective breeding – dog breeds. Genetic engineering (Biology)

Assessment points	<p>In class teacher led reviews and formative feedback – this low-risk challenge and review environment for pupils will include:</p> <ul style="list-style-type: none"> - recap recall quick starters, homework (Educake) (know) - review tasks, multiple choice and extended questions (extend) - in class exam style questions (apply) <p>Through rigorous, reliable and accessible assessment</p> <ul style="list-style-type: none"> - Formal assessments at the end of every unit of work (Mastery assessments – 10 question recall) across all 3 science subjects - End of learning cycle assessments (Progress check tests – a longer exam style question paper) 				
ECC Student Characteristics	<p>Through these units we will encourage students to work hard and be resilient individuals who embrace challenge and through their creativity and endeavours become reflective learners. Mastering the key concepts of each topic before being able to build on these ideas as they are interleaved through other units later in the course.</p>				
Connection to future learning (When is this developed / revisited)?	Review and revisiting all topics in the run up to the final exams in May	Review and revisiting all topics in the run up to the final exams in May	Review and revisiting all topics in the run up to the final exams in May	Review and revisiting all topics in the run up to the final exams in May	Review and revisiting all topics in the run up to the final exams in May