CNCS

KS4 Biology: Curriculum Overview

Rationale: In Year 10 and 11 students will build on prior knowledge from KS3 and develop their skills in key foundation concepts in Biology ready for sitting the external examinations in term 3.1 of yr11. In year 10 pupils will complete the paper 1 units and sit a paper mock at the end of year 10. In year 11 pupils will complete the paper 2 units and sit mocks in paper 1 and paper 2. Students will learn how to work safely in a lab and investigate scientific questions. Students will revisit and be introduced to a range of specific subject terminology, learning how to identify and discuss this appropriately. Furthermore, students will be given opportunities to develop their own personal responses to scientific problems and consider how to apply their knowledge to them

A learner in Year 10 will know/ have studied:	**A learner in Year 10 will be able to:**
B1; Cell Biology B2; Organisation B3; Infection & response B4; Bioenergetics **A learner in Year 11 will know/ have studied:** B5; Homeostasis B6; Inheritance, variation & evolution B7; Ecology	Work safety in lab and carry out investigations. They will be able to question and have begun to understand the world around them from the units studied. They will answer exam questions will confidence and skill and complete Biology paper 1 **A learner in Year 11 will be able to:** Work safety in lab and carry out investigations. They will be able to question and have begun to understand the world around them from the units studied. They will answer exam questions will confidence and skill and complete Biology paper 1 and 2.

Term	Outline	Assessment	Home Learning	Key Skills/ End Point
Yr10 1	**B1 Cells and transport** Students will • compare different types of cells and microscopes and use a light microscope to view cells (Required Practical) • describe the importance of cells becoming specialised through differentiation and the how this helps their function and ***describe how to prepare a sterile culture of bacteria (Required Practical) (LINKS TO B3)*** • describe the stages of mitosis and where it fits in the process of the cell cycle, sources of stem cells and their uses • describe the processes of diffusion, osmosis and active transport and examples of each type of transport in animals and plants and describe the effect of concentration of solution on osmosis in plant tissues (Required Practical) • describe the structure of a leaf and the function of the tissues present and the process of transpiration by evaporation of water from the leaf	**1.1 & 1.2 Pit stops** Cell Biology B1.1 Cell biology B1.2 **1.2 End of term assessment B1** **Skills tested:** AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry,	Weekly content recall and application questions set on Educake	**Skills:** • Recall of key knowledge through the use of low stakes testing. • Application of knowledge to unfamiliar contexts through exam question modelling. Interpretation of diagrams used to represent key processed. • Development of maths skills through converting units and calculating rate or surface area • Describing and explaining of graphical data when investigating the osmosis or bacterial growth. • Development of evaluative skills: use of stem cells to treat medical conditions.

		techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.		• Development of practical skills during the RP activities; taking measurements, recording results, assessing risks. **End point:** • Students are able to recall key knowledge and apply this knowledge to exam questions from different areas. • Students can interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts. • Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate medical treatments.
Yr10 2	**B2 Organisation** - describe how cells make up tissues, which make up organs, which make up organ systems, describe the structure and function of the digestive system and describe the structure and function of three digestive. - use food tests to identify what molecules are found in foods (Required Practical) and investigate the effect of pH or concentration on enzyme action (Required Practical) - describe the structure of the lungs, how they are adapted for gas exchange, the mechanism of breathing - describe the structure of the heart and associated blood vessels, compare the of structure and function of arteries, veins and capillaries, describe the four components of blood and their functions and state the causes and treatment of diseases of the heart, including CHD and faulty valves - describe how diseases interact with each other, how lifestyle can contribute to development of diseases, including diet,	**2.1 & 2.2 Pit stops** Organisation B1.1 Organisation B1.2 **2.2 End of term assessment B1 and B2** **Skills tested:** AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas;	Weekly content recall and application questions set on Educake	Students are able to recall key knowledge and apply this knowledge to exam questions from different areas. Students will interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts. Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate data provided. **Skills tested:** AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures.

	exercise, genetics, smoking and alcohol and state the difference between benign and malignant tumours and how cancer spreads around the body .	scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.		AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures. Students are able to recall key knowledge and apply this knowledge to exam questions from different areas.
Yr10 3	**B3 Infection and response** Students will - Define what a pathogen is and give examples of each type of pathogen and how they cause disease/spread/are treated - Describe how humans defend themselves against disease; before pathogens enter the bloodstream and after and how vaccination protects against disease and prevents spread of disease - State that antibiotics can be used to treat bacterial infections but not viruses (LINKS TO B1 and B6), describe where specific drugs originated from and that many drugs we use come from plants and state the stages in drug trialling to test for toxicity, efficacy and dosage - **Describe how monoclonal antibodies are produced and their uses** - **Causes and effects of plant disease/deficiencies and how they can be detected (LINKS to B7)** - **Ways in which plants defend themselves from disease and predators (LINKS to B7)** **B4 Bioenergetics** Students will - State the word and symbol equation for photosynthesis and how plants absorb the energy needed for this process (LINKS	**3.1 & 4.1 Pit stops** B3 Infection & response B3.1 Bioenergetics B4.1 **1.3 End of year assessment Biology paper 1 F/H** **Skills tested:** AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret	Weekly content recall and application questions set on Educake	Students are able to recall key knowledge and apply this knowledge to exam questions from different areas. Students will interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts. Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate data provided. **Skills tested:** AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures. Students are able to recall key knowledge and apply this knowledge to exam questions from different areas.

	to B2) and describe that photosynthesis is an endothermic reaction and state that plants produce glucose during photosynthesis and the 5 ways plants use this glucose - State the limiting factors of photosynthesis and how and why they affect rate of photosynthesis (Required Practical) - State the word and symbol equation for aerobic respiration and the word equation for anaerobic respiration in animals and in plants/yeast - State that respiration is an exothermic reaction and the uses of energy released from respiration - Describe the effects on the body of anaerobic respiration and the uses of products from anaerobic respiration in industry - Describe the effect of exercise on heart rate and breathing rate - Define metabolism, give examples of metabolic reactions and factors affecting a person's metabolic rate	and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.		Students will interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts. Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate data provided.
Yr11 1	**B5 Homeostasis and response** Students will • Describe homeostasis is the maintenance of internal conditions of the body, the sequence of a reflex arc and the function of reflex actions the structure of the CNS and describe how to investigate the effect of a named factor on reaction time (Required Practical) • Describe the structure of the brain and explain why treating brain injury is difficult and how the brain can be studied • Describe the structures and functions of the eye, explain how the pupil is involved in adapting to changing light levels, how the lens is involved in accommodation to focus on objects of different distances and how eye defects can be corrected using lenses • Describe the ways our body responds to high or low temperatures in terms of: hairs on skin, blood vessels, sweat production, shivering • Describe the location of the following organs in the endocrine system and their functions: pituitary gland, adrenal glands, ovaries, testes, thyroid gland, pancreas	**Baseline** Paper 1 areas of concern **5.1 & 5.2 Pit stops** Homeostasis B5.1 Homeostasis B5.2 **Mock** Most recent Biology 1 paper F or H, combined or separate **Skills tested:** AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and	2018-2023 Biology paper 1 combined or separate depending on course. Complete paper week A, green pen with mark scheme week B	**Skills:** • Recall of key knowledge through the use of low stakes testing. • Application of knowledge to unfamiliar contexts through exam question modelling. Interpretation of diagrams used to represent key processed. • Development of maths skills through converting units. • Describing and explaining of graphical data when investigating the effect of named factors reaction time • Development of evaluative skills: use of hormones. • Development of practical skills during the RP activities; taking measurements, recording results, assessing risks.

	• Describe the role of hormones • Describe the impact of insulin and glucagon on blood glucose levels and the causes of Type 1 and 2 diabetes • ***Describe the role of the kidney and ADH in producing water and maintaining water levels*** • Describe the role of hormones involved in the menstrual cycle and their specific functions as well as how they interact with each other • Describe methods of contraception, including role of hormones in oral contraceptives and how hormones can be used to treat infertility and the stages of IVF • Describe the roles of thyroxine and adrenaline • ***State examples of tropism in plants and how auxin is involved in phototropism and geotropism and the role of ethane and gibberellin*** • ***Investigate how light/gravity affects the growth of seedlings (Required Practical)***	understanding of: scientific ideas; scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.		**End point:** • Students are able to recall key knowledge and apply this knowledge to exam questions from different areas. • Students can interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts. • Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate medical treatments.
Yr11 2	**B6 Inheritance, variation and evolution** Students will • Describe the differences between sexual and asexual reproduction and the advantages and disadvantages of sexual and asexual reproduction • Describe the stages of the cell cycle and the specific stages of meiosis • Describe the structure of DNA • Describe the structure of a protein and the possible effects of a mutation • State the definitions of key terminology: gamete, chromosome, gene, allele, dominant, recessive, homozygous, heterozygous, genotype, phenotype • Complete a punnet square diagram to predict characteristics of offspring and describe the inheritance of cystic fibrosis, polydactyly and gender • Describe the causes of Variation and the processes of natural selection, selective breeding and genetic engineering (LINKS TO B7)	**6.1 & 6.2 Pit stops** Inheritance, variation and evolution Pitstop B6.1 Inheritance, variation and evolution B6.2 **Mock** Most recent Biology 2 paper F or H, combined or separate **Skills tested:** AO1: Demonstrate knowledge and understanding of:	2018-2023 Biology paper 2 combined or separate depending on course. Complete paper week A, green pen with mark scheme week B	**Skills:** • Recall of key knowledge through the use of low stakes testing. • Application of knowledge to unfamiliar contexts through exam question modelling. Interpretation of genetic diagrams. • Development of maths skills through converting units and calculating probability • Describing and explaining of graphical data • Development of evaluative skills: advantages and disadvantages of mechanical devices/transplants to treat organ failure; evaluating the risks associated with IVF; benefits and concerns of GM crops; evaluating theories and

	• Describe methods of cloning in plants and animals; adult cell cloning steps • ***Compare Darwin and Lamarck's theories*** • ***Describe the process of speciation*** • Describe Mendel's role in our understanding of genetics • Describe how fossils are evidence of evolution and how they are fossils may be formed • Describe the factors leading to extinction • Describe how antibiotic resistant bacteria develop (LINKS TO B3) and the advice Doctors should give to reduce rate of development of antibiotic resistance • Describe the three-domain system and the hierarchy of the classification system **<u>B7 Ecology</u>** Students will • Describe the resources animals and plants compete for, the factors affect communities, the levels of organisation in an ecosystem: organism, population, community, ecosystem, and the difference between biotic and abiotic factors and examples of each • Describe the adaptations of organisms to allow them to survive in a particular environment e.g. cold, hot and that extremophiles are organisms that live in extreme conditions	scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures. **<u>7.1 & 7.2 Pit stops</u>** Ecology 7.1 Ecology 7.2		understanding why they develop over time. • Development of practical skills during the RP activities; taking measurements, recording results, assessing risks. **End point:** • Students are able to recall key knowledge and apply this knowledge to exam questions from different areas. • Students can interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts. • Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate various theories/treatments/processes. **Skills:** Students are able to recall key knowledge and apply this knowledge to exam questions from different areas. Students will interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts. Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate data provided

	• Describe how the abundance of organisms can be estimated/investigated using quadrats (Required Practical) • Describe the processes that occur in the carbon cycle, including: photosynthesis, respiration, decay and combustion, the processes in the water cycle, including evaporation and precipitation and the conditions required for decomposition • ***Investigate how the rate of decay of milk can be investigated (Required Practical)*** • ***Describe the use of biogas generators in producing fuels*** • How changes to temperature, levels of atmospheric gases and water availability affect distribution of organisms, that biodiversity is the variety of all different species in an ecosystem and why it is important, the role of waste management, land use, deforestation and global warming in affecting biodiversity and the ways that we can help to maintain biodiversity • ***How to use trophic levels to draw pyramids of biomass, how biomass/energy is lost as you move along the food chain, what food security is and how we are threatening it globally, how farmers can increase the efficiency of food production by controlling temperature and amount of movement, how fishing can be made sustainable, how fungi are used to produce mycoprotein and how bacteria can be used to mass produce hormones like insulin*** (LINKS TO B6			
Yr11 3	Pupils will follow a bespoke revision programme covering paper 1 and paper 2. This will be inline with the collapsed curriculum that the school offer. -	**<u>3.2 End of term assessment</u>** Pupils will sit external examinations in Biology **<u>Skills tested:</u>** AO1: Demonstrate knowledge and understanding of:		

		scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.		