Space Studio West London
an Aspirations Academy

Biology - Curriculum Plan

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 10 curriculum overview	B1 - Cells and transport B2 - Cell division B3 - Organisation and digestion	B3 - Organisation and digestion B4 - organising animals and plants B5 - Communicable diseases	B5 - Communicable diseases B6 - Preventing and treating disease B7 - Non-communicable disease	B8 - Photosynthesis B9 - Respiration B10 - Nervous system	B11 - Hormonal coordination B12 - Homeostasis in action	B13 - Reproduction
Key knowledge outcomes (students should know)	• RPA 1 - Using a light microscope • RPA 3 - investigating the effect of salt solutions on plant tissue • All living organisms are made of cells. • Animal and plant cells contain a nucleus, cytoplasm, cell membrane, mitochondria and ribosomes. • Plant cells also have a cell wall, permanent vacuole and chloroplasts. • Bacteria are **prokaryotes** (no nucleus or membrane-bound organelles). • Electron	• RPA 4 - using food test to identify food • Investigating the affect of pH on rate of reaction of amylase • RPA 2 - investigating antrispectics • Cells → tissues → organs → organ systems. • Enzymes are biological catalysts. • Amylase digests starch into sugars. • Protease digests proteins into amino acids. • Lipase digests fats into fatty acids and glycerol. • Humans have a double circulatory system.	• New drugs are tested for safety and effectiveness. • Clinical trials involve healthy volunteers then patients. • Placebos help ensure fair testing. • Double-blind trials reduce bias. • Monoclonal antibodies can diagnose and treat disease. • Cannot be passed from one person to another. • Usually develop due to lifestyle, genetics or environmental factors. • Examples include cardiovascular disease, cancer,	• RPA 6 - investigating the effect of light on photosynthesis • RPA 7 - investigating factors that affect reaction time • Plants convert light energy into glucose. • Equation: Carbon dioxide + Water → Glucose + Oxygen. • Chlorophyll absorbs light energy. • Rate depends on light intensity, CO_2 concentration and temperature. • Glucose is used for respiration, starch, cellulose and proteins. • Aerobic respiration releases energy using oxygen.	• RPA 8 - investigating the effect on light/gravity on seedlings • Hormones are chemical messengers carried in blood. • Adrenaline prepares the body for "fight or flight." • Thyroxine controls metabolic rate. • Menstrual cycle hormones include FSH, LH, oestrogen and progesterone. • Hormonal contraception prevents pregnancy. • Homeostasis keeps internal conditions stable. • Blood glucose is controlled by insulin	• Sexual reproduction produces genetic variation. • Fertilisation forms a zygote. • Asexual reproduction produces identical offspring. • DNA carries genetic information. • Variation is caused by genes and environment.

	microscopes show much more detail than light microscopes. • Mitosis produces **two genetically identical** daughter cells. • Chromosomes duplicate before division. • Used for growth, repair and asexual reproduction. • Stem cells can differentiate into specialised cells. • Animal stem cells are found in embryos and bone marrow. • Diffusion moves particles from high to low concentration. • Osmosis is movement of water through a partially permeable membrane. • Active transport moves substances against the concentration gradient using energy. • Surface area, temperature and	• The heart pumps blood to the lungs and around the body. • Blood transports oxygen, nutrients, hormones and waste products. • Arteries carry blood away from the heart. • Veins return blood to the heart. • Xylem transports water and mineral ions upwards. • Phloem transports dissolved sugars around the plant. • Meristem tissue contains cells that divide for growth. • Xylem cells are dead and strengthened with lignin. • Phloem transport occurs in both directions. • Pathogens include bacteria, viruses, fungi and protists. • Diseases spread by air, water, direct contact or vectors. • Vaccination provides immunity. • Antibiotics kill bacteria but not	diabetes and lung disease. • They are responsible for most deaths in developed countries. • Risk can often be reduced through a healthy lifestyle.	• Equation: Glucose + Oxygen → Carbon dioxide + Water. • Anaerobic respiration releases less energy. • In muscles, anaerobic respiration produces lactic acid. • Energy is used for movement, growth and maintaining body temperature. • The nervous system responds quickly to stimuli. • Reflexes are rapid automatic responses. • Receptors detect changes in the environment. • Neurones carry electrical impulses. • The brain coordinates responses.	and glucagon. • Body temperature is regulated by sweating and shivering. • Water balance is controlled by the kidneys and ADH. • Negative feedback restores normal conditions.	

	concentration affect diffusion rate. • Adaptations (e.g. villi, root hairs) increase exchange efficiency.	viruses. • Good hygiene reduces disease spread.				
Key skills (students should be able to)	• How to take measurements and reduce errors. • How to safely use a microscope • Mathematical skills - substitution, rearranging equations, standard form, multistep calculations and unit conversions. • Graphical skills - plotting scatter graphs, lines of best fit. • Extended writing; comparisons, interpreting data and practical methods. • Interpreting graphs.	• How to take measurements and reduce errors. • How to safely use a iodine and other chemicals. • Graphical skills - plotting scatter graphs, lines of best fit. • Extended writing; comparisons, interpreting data and practical methods. • Interpreting graphs.	• Graphical skills - plotting scatter graphs, lines of best fit. • Extended writing; comparisons, interpreting data. • Interpreting graphs.	• How to take measurements and reduce errors. • Graphical skills - plotting scatter graphs, lines of best fit. • Extended writing; comparisons, interpreting data and practical methods. • Interpreting graphs. • Word equations • Balanced symbol equations	• How to take measurements and reduce errors. • Mathematical skills - substitution, rearranging equations, standard form, multistep calculations and unit conversions. • Graphical skills - plotting scatter graphs, lines of best fit. • Extended writing; comparisons, interpreting data and practical methods. • Interpreting graphs.	• Graphical skills - plotting scatter graphs, lines of best fit. • Extended writing; comparisons, interpreting data and practical methods. • Interpreting graphs.
Year 11 curriculum overview	B10 - Nervous system B11 - Hormonal coordination B12 - Homeostasis in action	B12 - Homeostasis in action B13 - Reproduction B14 - Variation and evolution	B14 - Variation and evolution B15 - Genetics and evolution B16 - Adaption, independence and competition	B17 - Organising and ecosystem B18 - Biodiversity and ecosystems	Exam Practice	N/A

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Key knowledge outcomes (students should know)	• RPA 7 - investigating factors that affect reaction time • RPA 8 - investigating the effect on light/gravity on seedlings • The nervous system responds quickly to stimuli. • Reflexes are rapid automatic responses. • Receptors detect changes in the environment. • Neurones carry electrical impulses. • The brain coordinates responses. • Hormones are chemical messengers carried in blood. • Adrenaline prepares the body for "fight or flight." • Thyroxine controls metabolic rate. • Menstrual cycle hormones include FSH, LH, oestrogen and progesterone. • Hormonal contraception prevents pregnancy. • Homeostasis keeps	• Sexual reproduction produces genetic variation. • Fertilisation forms a zygote. • Asexual reproduction produces identical offspring. • DNA carries genetic information. • Variation is caused by genes and environment. • Mutations create new alleles. • Natural selection explains evolution. • Organisms with beneficial adaptations survive and reproduce. • Fossils provide evidence for evolution. • Selective breeding and genetic engineering change organisms.	• RPA 9 - measuring population size • Genes are sections of DNA on chromosomes. • Alleles can be dominant or recessive. • Genotype = genetic makeup. • Phenotype = observable characteristics. • Punnett squares predict inheritance probabilities. • Organisms are adapted to their environments. • Competition occurs for food, water, light and mates. • Predator-prey relationships affect populations. • Biodiversity increases ecosystem stability. • Changes in one species affect others in food webs.	• RPA 10 - investigating the effect of temperature on decay • Energy transfers through food chains. • Biomass decreases at each trophic level. • Decomposers recycle nutrients. • The carbon cycle moves carbon through ecosystems. • The water cycle continuously recycles water. • Deforestation reduces biodiversity. • Global warming is caused by greenhouse gases. • Pollution damages ecosystems. • Conservation protects endangered species and habitats. • Sustainable development balances human needs with environmental protection.	• Feedback from PPE's. • Content from all units. • Recap of practical methods.	N/A

	internal conditions stable. • Blood glucose is controlled by insulin and glucagon. • Body temperature is regulated by sweating and shivering. • Water balance is controlled by the kidneys and ADH. • Negative feedback restores normal conditions.					
Key skills (students should be able to)	• How to take measurements and reduce errors. • Mathematical skills - substitution, rearranging equations, standard form, multistep calculations and unit conversions. • Graphical skills - plotting scatter graphs, lines of best fit. • Extended writing; comparisons, interpreting data and practical methods. • Interpreting graphs.	• Graphical skills - plotting scatter graphs, lines of best fit. • Extended writing; comparisons, interpreting data and practical methods. • Interpreting graphs.	• How to take measurements and reduce errors. • Graphical skills - plotting scatter graphs, lines of best fit. • Extended writing; comparisons, interpreting data and practical methods. • Interpreting graphs.	• How to take measurements and reduce errors. • Graphical skills - plotting scatter graphs, lines of best fit. • Extended writing; comparisons, interpreting data and practical methods. • Interpreting graphs.	• Answering simple mathematical questions based on substitution. • Answering multistep mathematical questions involving rearrangement. • Answering mathematical questions involving standard form and unit conversion. • Answering extended mathematical questions with multiple equations and skills. • Answering short exam questions based on knowledge.	N/A

					• Answering extended questions of a topic in sustained long answers. • Answering questions that link topics in both mathematics and extended writing. • Interpreting data/graphs and how to answer questions based on unknown data.	

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Year 12 curriculum overview	**Chapter 2 -** Basic Components of Living Systems. **Chapter 3.1 - 3.4 -** Biological Molecules **Chapter 10 -** Classification **Chapter 11.1 - 11.4 -** Evolution and Biodiversity Nb* Statistical tests to be embedded throughout.	**Chapter 3.5 - 3.11** - Biological Molecules **Chapter 4 -** Enzymes **Chapter 11.5 - 11.8** - Evolution and Biodiversity **Chapter 12.1 - 12.4 -** Communicable Disease	**Chapter 5 -** Plasma Membranes **Chapter 7 -** Exchange Surfaces **Chapter 12.4 - 12.7 -** Communicable Disease **Chapter 6 -** Cell Division	**Chapter 7 -** Transport in Animals **Chapter 8 -** Transport in plants	Revision/AS Examination	**Chapter 13 -** Neuronal Communication **Chapter 19 -** Genetics Nb* This is the start of the A2 content
Key knowledge	Cells are the	Proteins have	Plasma membranes	The mammalian		The nervous system

outcomes (students should know)	fundamental units of life and the structure of prokaryotic and eukaryotic cells is related to their function. Biological molecules, including carbohydrates, lipids, proteins and nucleic acids, are essential for the structure and functioning of living organisms. Microscopy enables scientists to study cell structure and investigate biological specimens. Organisms can be classified using biological features and evolutionary relationships. Biodiversity can be measured and is influenced by environmental and genetic factors.	different levels of structure which determine their function. DNA stores genetic information and directs protein synthesis. ATP functions as the immediate energy source for cellular processes. Enzymes act as biological catalysts and their activity is influenced by environmental conditions. Evolution results from changes in allele frequencies over time and contributes to species diversity. Conservation strategies are important for maintaining biodiversity.	regulate the movement of substances into and out of cells. Diffusion, facilitated diffusion, osmosis and active transport are essential transport mechanisms. Cell division enables growth, repair and genetic continuity. Exchange surfaces are specialised to maximise efficient exchange of substances. Communicable diseases are caused by pathogens with different modes of transmission. The body's primary and secondary defenses reduce the spread of infectious diseases.	circulatory system is adapted for efficient transport of substances. The structure of the heart, blood vessels and blood components relates to their functions. Plants possess specialised transport tissues for the movement of water, minerals and assimilates. Transpiration and translocation are essential transport processes in plants. Environmental factors influence transport processes in plants and animals.		enables rapid communication and coordination through electrical impulses. Neurones are specialised cells adapted to transmit impulses and communicate via synapses. Muscle contraction is coordinated through interactions between neurones, neurotransmitters and muscle fibres. Genetic variation arises through mutation, meiosis and random fertilisation. DNA sequences determine the synthesis of proteins and influence phenotypic characteristics. Genetic diversity provides the basis for

	Evolution occurs through natural selection and provides evidence for the diversity of life.					evolution by natural selection.
Key skills (students should be able to)	Use and interpret light and electron microscope images. Calculate magnification and actual size using the magnification equation. Perform and interpret qualitative tests for biological molecules. Compare and contrast biological structures and molecules. Construct and interpret classification keys and phylogenetic trees. Analyse evidence supporting evolutionary theory and biodiversity.	Explain the relationship between molecular structure and biological function. Interpret graphical data showing enzyme activity. Analyse the effects of environmental factors on enzyme-controlled reactions. Evaluate scientific evidence relating to conservation and biodiversity. Apply knowledge of DNA structure to explain protein synthesis. Use mathematical	Explain how membrane structure relates to transport mechanisms. Predict the movement of substances across membranes. Interpret data from investigations involving osmosis and diffusion. Compare adaptations of exchange surfaces in different organisms. Analyse data relating to disease transmission and epidemiology. Evaluate methods used to prevent and control communicable diseases.	Interpret diagrams and data relating to the cardiovascular system. Explain the relationship between structure and function in transport systems. Investigate factors affecting transpiration using experimental data. Analyse experimental evidence relating to plant transport mechanisms. Compare transport systems in plants and animals. Evaluate the efficiency of biological transport		Explain how nerve impulses are generated and transmitted. Interpret diagrams and data relating to synaptic transmission and muscle contraction. Apply knowledge of DNA structure to explain genetic variation. Analyse genetic data and identify sources of variation. Interpret graphical and experimental data related to inheritance and genetics.

		skills to analyse biological data and experimental results.		systems using scientific evidence.		Construct extended scientific explanations linking genes, proteins and phenotype.
Year 13 curriculum overview	**Chapter 14 -** Hormonal Communication **Chapter 16 -** Plant Responses **Chapter 18 -** Respiration	**Chapter 15 -** Homeostasis **Chapter 20 -** Pattern of inheritance	**Chapter 21 -** Manipulating Genomes **Chapter 22 -** Cloning and Biotechnology **Chapter 23 -** Ecosystems	**Chapter 24 -** Populations and Sustainability	Revision/Consolidation of year 12 topics.	Revision/A2 Examination
Key knowledge outcomes (students should know)	Hormones coordinate physiological processes through chemical signalling and negative feedback mechanisms. Blood glucose concentration is regulated by insulin and glucagon to maintain homeostasis. Plants respond to internal and external stimuli through hormonal control and tropisms.	Homeostasis maintains a stable internal environment through negative feedback mechanisms. The kidneys regulate water potential and remove metabolic waste products. The liver performs essential metabolic and detoxification functions. Genetic inheritance	DNA technology enables the manipulation of genomes for scientific, medical and agricultural purposes. Recombinant DNA technology and gene editing have a range of applications and ethical considerations. Cloning and biotechnology contribute to medicine, agriculture and industry.	Population size is influenced by environmental factors and interactions between organisms. Succession leads to changes in ecosystem structure and biodiversity over time. Sustainable management aims to balance environmental, economic and social needs. Conservation		

	Respiration transfers energy from glucose to ATP through a series of enzyme-controlled reactions. Aerobic and anaerobic respiration differ in their pathways, products and energy yield. ATP is essential for cellular processes across all living organisms.	follows predictable patterns based on the behaviour of alleles. Autosomal, sex-linked and multiple allele inheritance influence phenotypic variation. Chi-squared analysis is used to compare observed and expected genetic ratios.	Ecosystems consist of interacting biotic and abiotic components. Nutrient cycling and energy transfer underpin ecosystem stability. Human activities can influence ecosystem functioning and biodiversity.	strategies help protect biodiversity and ecosystem services. Human activities influence global sustainability through resource use and environmental change. Scientific evidence informs decisions about conservation and sustainable development.		
Key skills (students should be able to)	Explain how hormonal and nervous systems coordinate responses. Interpret data relating to blood glucose regulation and diabetes. Analyse experimental evidence investigating plant growth responses.	Explain mechanisms involved in maintaining homeostasis. Interpret physiological data relating to kidney and liver function. Construct and interpret genetic crosses and pedigrees. Calculate expected	Explain techniques used in genetic engineering and biotechnology. Evaluate ethical, social and environmental implications of genome manipulation. Interpret data relating to ecological investigations.	Interpret population and ecological data. Calculate and analyse population changes using biological data. Evaluate conservation strategies using scientific evidence. Analyse ecological relationships within communities.		

	Explain the stages of respiration and their importance in energy transfer. Interpret graphical data relating to respiration rates and environmental factors. Evaluate biological evidence and experimental investigations.	phenotypic and genotypic ratios. Perform and interpret chi-squared calculations. Evaluate evidence supporting patterns of inheritance.	Analyse nutrient cycles and energy flow within ecosystems. Apply biological knowledge to unfamiliar environmental scenarios. Evaluate scientific evidence from biotechnology and ecology.	Apply biological principles to sustainability issues. Construct balanced scientific arguments supported by evidence.		