

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>Content</p> <p>Knowledge</p>	<p>a) Development of Practical Skills in Biology</p> <ul style="list-style-type: none"> • Planning • Implementing • Analysis • Evaluation <p>Module 1: Development of Practical Skills in Biology Knowledge An introduction to the practical skills students will explore through their required practical component to fulfill the practical endorsement.</p> <p>b) Foundations in Biology: Cell Structure</p> <ul style="list-style-type: none"> • Microscopes • Organelles • Prokaryotic vs. Eukaryotic <p>Module 2: Cell Structure and Microscopes Knowledge Know the different types of microscopes and their uses in microscopy. Understand the difference between resolution and magnification. List and describe the roles of organelles in</p>	<p>a) Exchange Surfaces: Transport in Animals</p> <ul style="list-style-type: none"> • Transport systems • Circulatory system • Tissues and tissue fluid • Mammalian heart • ECG traces • Haemoglobin <p>Module 3: Transport in Animals Knowledge Understand the need to supply nutrients to, and remove waste from individual cells. Understand how the heart and circulatory system coordinate the supply of nutrients and removal of waste.</p> <p>b) Exchange Surfaces: Transport in Plants</p> <ul style="list-style-type: none"> • Vascular systems • Transpiration • Water transport • Plant adaptation • Translocation <p>Module 3: Transport in Plants Knowledge: Understand that transport systems are essential in large, complex plants to supply nutrient to, and remove waste from, individual cells. Explain</p>	<p>a) Foundations in Biology: Enzymes</p> <ul style="list-style-type: none"> • Intracellular and extracellular reactions • Enzyme action • pH, concentration, and temperature on enzyme action • coenzyme, cofactors and prosthetic groups • inhibitors and toxins <p>Module 2: Enzymes Knowledge Know how enzymes catalyse reactions. Describe the lock and key and the induced fit model. Explain how different factors can affect the rate of reaction of enzymes. Understand the need for cofactors, coenzymes and prosthetic groups. Know the effect inhibitors and toxins can have on enzyme action.</p> <p>b) Foundations in Biology: Biological Membranes</p> <ul style="list-style-type: none"> • Fluid Mosaic Model • Factors affecting membranes <p>Module 2: Biological Membranes Knowledge Understand why the cell</p>	<p>a) Foundations in Biology: Biological Membranes</p> <ul style="list-style-type: none"> • Movement across membranes <p>Module 2: Biological Membranes Knowledge Explain how different substances move across membranes through active transport, osmosis, diffusion and facilitated diffusion. Describe what is meant by bulk transport and when it might be used.</p> <p>b) Foundations in Biology: Cell Division, cell diversity, and cellular organisation</p> <ul style="list-style-type: none"> • The cell cycle • Mitosis • Meiosis • Specialised Cells • Stem Cells <p>Module 2: Cell Division, Cell diversity, and cellular organisation Knowledge Explain the events in the cell cycle. Explain how somatic cells divide through mitosis and sex cells divide through meiosis. Look at various specialised cells seen throughout the course and explain how they are adapted for their role. Describe the different types of stem cells and</p>	<p>Revision of Modules 1-4</p> <ul style="list-style-type: none"> • To focus on recapping key knowledge and re-address common misconceptions • Embed additional exam practice for each chapter • Focus on key aspects of required practicals 	<p>Revision of Modules 1-4</p> <ul style="list-style-type: none"> • To focus on recapping key knowledge and re-address common misconceptions • Embed additional exam practice for each chapter • Focus on key aspects of required practicals

	<p>eukaryotic cells. Outline differences between prokaryotic and eukaryotic cells.</p> <p>c) Foundations in Biology: Biological Molecules</p> <ul style="list-style-type: none"> • Monomers and polymers • Properties of water • Carbohydrates <p>Module 2: Biological Molecules Knowledge Recall polymerisation reactions and different types of bonds. Explore the properties of water and how these properties allow for survival in organisms. Know the structures of glucose and how polysaccharides are made.</p> <p>c) Exchange and Transport: Exchange Surfaces</p> <ul style="list-style-type: none"> • Specialised Exchange Surfaces • Mammalian gaseous exchange system • Ventilation <p>Module 3: Exchange Surfaces Knowledge Know why ventilation and gas exchange systems are vital in large and active animals. Explore the ventilation and gas exchange systems in mammals, bony fish</p>	<p>the need for a vascular system to transport nutrients from the soil and the products of photosynthesis.</p> <p>c) Foundations in Biology: Biological Molecules</p> <ul style="list-style-type: none"> • Lipids • Proteins • Inorganic ions • Paper Chromatography • Colorimetry <p>Module 2: Biological Molecules Knowledge Know the structure of a triglyceride and proteins and how they are formed through condensation reactions. Understand how water is used to break triglycerides and proteins into their respective monomers. List inorganic ions explored throughout all modules in the course and their biological relevance. Explore how paper chromatography and colorimetry are carried out and their uses in industry.</p> <p>d) Foundations in Biology: Nucleotides and nucleic acids</p> <ul style="list-style-type: none"> • Synthesis and breakdown of polynucleotides • ADP and ATP • Structure of DNA • DNA replication • Genetic Code • Protein Synthesis <p>Module 2: Nucleotides and Nucleic Acids Knowledge Understand the structure of a nucleotide. Explain the</p>	<p>membrane is considered to have a fluid mosaic model. Describe how different factors can affect the structure of membranes.</p> <p>c) Biodiversity, evolution and disease: Communicable diseases, disease prevention and the immune system</p> <ul style="list-style-type: none"> • Pathogens • Transmission of pathogens to animals and plants • Plant defenses • Primary non-specific defenses • Phagocytes • B and T lymphocytes • Primary and secondary immune response • Antibodies (opsonins, agglutinins, and antitoxins) • Active vs. Passive immunity • Autoimmune diseases <p>Module 4 Communicable Diseases, disease prevention and the immune system Knowledge Know and understand that a variety of organisms are pathogenic. Explain how plants and animals have evolved defenses to deal with disease. Know the impact of the evolution of pathogens and how it has affected the treatment of disease. Explain the role of the immune system.</p>	<p>evaluate their use in various medical treatments.</p> <p>b) Biodiversity, evolution and disease:</p> <p>Biodiversity</p> <ul style="list-style-type: none"> • Biodiversity • Sampling methods • Species richness • Species evenness • Simpson's Index of diversity • Genetic biodiversity • Maintaining biodiversity • Conservation <p>Module 4: Biodiversity Knowledge Learn what is meant by biodiversity and the importance of maintaining it. Make links between biodiversity and habitats. Understand that actions to maintain biodiversity need to be taken at a local, national and global level.</p> <p>c) Biodiversity, evolution and disease:</p> <p>Classification and Evolution</p> <ul style="list-style-type: none"> • Classification of species • Binomial system • Phylogeny • Evidence for theory of evolution by natural selection • Variation • Adaptations <p>Module 4: Classification and Evolution Knowledge Learn the relationship between organisms based on variation, evolution and phylogeny. Explain how classification systems have changed. Look at</p>		
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	and insects.	synthesis and breakdown of polynucleotides. Learn the structure of ADP and ATP. Learn the structure of DNA . Describe how DNA undergoes semi-conservative replication and the practical work using nitrogen isotopes that led to this discovery. Understand the nature of the genetic code. Explain how proteins are made.		evolution leading to resistant pathogens.Explore different adaptions of organisms to their environment. Describe how natural selection can affect the characteristics of a population over time.		
Skills	<ul style="list-style-type: none"> Manipulate the magnification formula to work out image size, actual size or magnification Use graticules to measure cells Dissect a bony fish and locust Qualitatively test for the presence of glucose 	<ul style="list-style-type: none"> Dissect a mammalian heart and plant stem Use staining techniques when observing a stem under the microscope Qualitatively test for proteins, and lipids Extract DNA from a kiwi fruit Collect quantitative results using a colorimeter and doing paper chromatography 	<ul style="list-style-type: none"> Qualitatively test how different factors such as concentration, temperature and pH affect the rate of reaction of enzymes Qualitatively test how temperature affects membranes 	<ul style="list-style-type: none"> Qualitatively test the movement of water in potatoes Carry out sampling techniques using transects and quadrats 	<ul style="list-style-type: none"> Recalling important information Exam Technique Spacing Interleaving Elaboration 	<ul style="list-style-type: none">
Key Questions	<p>Why do multicellular organisms need a transport system? Why do we stain cells? What are the roles of organelles in cells? How are prokaryotic cells and eukaryotic cells different? How do we go from monomers to polymers?</p>	<p>How does the heart work? How do plants get the water and nutrients they need? How does DNA make a copy of itself? How are proteins made?</p>	<p>What is a communicable disease? How do inhibitors affect enzymes? What is the cell membrane made up of? What is the role of the immune system and how does it work? What is an autoimmune disease?</p>	<p>How can we move different ions or molecules into cells? What is meant by conservation? How can we find out how many organisms there are in a particular place? How are stem cells used in medicine? Why do cells divide?</p>		

	Why is water important in the survival of living organisms?					
Assessment	End of topic Test: 1) Cells and Microscopes PAG 1 Microscopy PAG 9 Qualitative Testing	End of topic tests: 1) Exchange Surfaces and transport in Animals 2) Exchange Surfaces and transport in Plants 3) Biological Molecules PAG 2 Dissection PAG 5 Colorimeter and Potometer PAG 9 Qualitative Testing PAG 6 Chromatography Pag 10 Computer Modelling	End of topic tests: 1) Enzymes 2) Disease PAG 4 Rates of enzyme controlled reactions	End of topic tests: 1) Membranes 2) Classification, Biodiversity and Evolution 3) The Cell Cycle PAG 8 Transport in and out of cells PAG 3 Sampling techniques PAG 11 Investigation into the measurement of animal responses		UCAS Mock Exam Modules 1-4
Literacy/numeracy/ SMSC/Character	Key words: resolution, magnification, eukaryotic, prokaryotic, repeatability, accuracy, precision, validity, polymerisation, hydrolysis, condensation, hydrogen bond, glycosidic bond, surface area:volume Numeracy: calculating SA:V, rearranging magnification formula, measuring size of cells using a graticule	Key words: semi-conservative, degenerate, phosphorylation, haemoglobin, affinity, symplast, apoplast, sink, source, companion cell, sieve tube, triglyceride, polypeptide, nucleotide, vascular, transpiration, translocation, assimilates Numeracy: calculating area, calculating rate, interpreting data from graphs and tables	Key words: activation energy, V _{max} , limiting factor, inhibitor, active site, allosteric site, lymphocytes, phagocytes, cytokines, autoimmune, memory cells, helper cells, antibody, glycolipid, glycoprotein, phospholipid, cholesterol, hydrophobic, hydrophilic, communicable disease, non-communicable disease Numeracy: calculating rate, calculating temperature coefficient, interpreting data	Key words: bulk transport, active transport, water potential, osmosis, facilitated diffusion, diffusion, permeable, conservation, in-situ, ex-situ, species richness, species evenness, cytokinesis, interphase, mitosis, prophase, metaphase, anaphase, telophase, bivalent, sister chromatid, histone, totipotent, pluripotent. Numeracy: Simpson's Diversity Index		
Enrichment opportunities and futures	Learn about conservation and breeding programs at ZSL in Regent's Park, London. Visit Kew gardens and explore the biodiversity of plant species in Kew, London. See Darwin's original copy of <i>On the Origin of Species</i> at The Natural History Museum in South Kensington, London. See the archaeopteryx and learn about its importance in terms of evolution at The Natural History Museum in South Kensington, London. Visit Watson and Crick's original DNA model at the Science Museum in South Kensington- See their model up close					