

## Biology Curriculum Map

Curriculum - Overview						
Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
<p>During Year 7, students start to develop their ideas from KS2 about energy, forces, waves and space.</p> <p>We build working scientifically skills into our science curriculum. This includes;</p> <ul style="list-style-type: none"> <li>• Basic safety</li> <li>• Measuring accurately and units</li> <li>• Reliability, precision and accuracy</li> <li>• Calculating averages and identifying errors</li> <li>• Identifying and selecting variables</li> <li>• Adding data to and creating tables</li> <li>• Creating simple methods</li> <li>• Graphs</li> <li>• Patterns in data</li> <li>• Predictions and hypothesis</li> </ul>	<p>During Year 8, students continue to d</p> <p>We continue build on their working scientifically skills, including;</p> <ul style="list-style-type: none"> <li>• Risk assessing</li> <li>• Bias and objectivity</li> <li>• Reducing bias and peer review</li> <li>• Method writing</li> <li>• Reliability, precision and accuracy</li> <li>• Judging data</li> <li>• Evaluating methods</li> <li>• Patterns in data</li> <li>• Graphs and lines of best fit</li> <li>• Hypothesis</li> <li>• Concluding</li> <li>• Analysis and evaluation</li> <li>• Global connectivity</li> <li>• Role of research</li> </ul>	<p>During Year 9 students Working scientifically skill development is continued in KS3 and develop these skills further at GCSE.</p> <ul style="list-style-type: none"> <li>• Reliability, precision and accuracy</li> <li>• Evaluating risk</li> <li>• Method creation</li> <li>• Analysis and evaluation</li> <li>• Designing further experiments and questions to support data</li> <li>• Concluding</li> </ul> <p><b>GCSE Core practical work focuses on:</b></p> <ul style="list-style-type: none"> <li>• Microscope work</li> <li>• Osmosis</li> <li>• Enzymes</li> <li>• <b>Food tests</b></li> </ul>	<p><b>Information in bold is only relevant to separate science students.</b></p> <p>During Year 10, students utilise the biology key concepts covered in Year 9. Students revisit and build on their knowledge of cells, growth, inheritance and disease.</p> <p><b>GCSE Core practical work focuses on:</b></p> <ul style="list-style-type: none"> <li>• Photosynthesis</li> <li>• DNA extraction</li> <li>• <b>Microbial cultures</b></li> </ul>	<p><b>Information in bold is only relevant to separate science students.</b></p> <p>During Year 11, students build upon the biology key concepts covered in Year 10. This allows them to develop an understanding in interdependence and body systems, including tissues and specialised cells.</p> <p><b>GCSE Core practical work focuses on:</b></p> <ul style="list-style-type: none"> <li>• Field work</li> <li>• Respiration</li> </ul>	<p>A-Level Biology year 1 builds on the concepts and knowledge learned in GCSE Biology but goes into much greater depth. Students develop a higher level of critical thinking, problem-solving, and analytical skills.</p> <p>Concepts learned which build upon KS4;</p> <p>Exchange and Transport Systems, Protein synthesis, Cells and cell structure, division, Immune system</p> <p>New Concepts which extend KS4 knowledge;</p> <p>Biological molecules, Diversity, Selection and classification, Statistics for biology.</p> <p>Practical work focuses on the 6 assessed practical work for the practical endorsement building on skills developed in KS4.</p>	<p>A-Level Biology Year 2 develops and further builds on the concepts learned in year 1. Some of these concepts were introduced in KS4 but extend utilising skills from Year 12. Homeostasis, respiration, photosynthesis, Nutrient cycles, nervous coordination. Inheritance.</p> <p>New concepts which extend skills learned in year 1 and KS4 include; Genes and gene expression, genome projects, Populations and ecosystems,</p> <p>Practical work focuses on the 6 more assessed practical work for the practical endorsement building on skills developed in Year 12.</p>

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### Curriculum – Topic Sequencing

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<p><b>B1: Cells</b> This topic focuses on what it means to be living. Students compare plant and animal cells. They use microscopes to help observe cells and calculate magnification.</p> <p><b>B2: Inheritance and the Genome</b> This topic focuses on the nucleus on cells. Students explore, chromosomes, genes and DNA. They start to learn the basics of inheritance, including the use of punnet squares and inherited diseases.</p> <p><b>B3: Diffusion and the cell membrane</b> This topic focuses on the cell membrane and how substances can move across this membrane by diffusion. Student</p>	<p><b>B8: Animal growth and reproduction</b> During this topic look at reproduction in humans and pregnancy. Contraception is discussed from the perspective of preventing pregnancy, but also STIs. The effect of smoking during pregnancy is considered.</p> <p><b>B9: Plant reproduction</b> Building upon KS2 and animal reproduction. Students build an understanding of how different plants reproduce to create their offspring. This topic also gives students the ability to focus on the differences between human and plant reproduction.</p>	<p><b>B13: Cellular respiration</b> Student build links to their previous learning to investigate aerobic and anaerobic respiration. They will delve into the methods in which substances can move in and out of cells, which aid the process of us animals making energy from the food we eat.</p> <p><b>GCSE</b></p> <p><b>Key concepts in Biology</b> Students build upon their KS3 learning to explore eukaryotic and prokaryotic cells. Enzymes and their roles in the digestion of food molecules in the human body. Students continue to focus and build on the work from the</p>	<p><b>Cells and Control</b> Building upon student KS3 understanding of cells, students learning about cell division in more depth. They learn about mitosis and its importance in growth, repair and asexual reproduction. They focus on how cells become specialised, and the importance of stem cells. This then allows students to build an understanding about the different specialised cells in the nervous system and explain how the system works. <b>Separate science students also study the eye and the brain.</b></p>	<p><b>Ecosystems and material cycles</b> Students build upon their knowledge or relationships, by investigating mutualistic and parasitic relationships. We start to build an understanding of human impact within ecosystems and how they can be preserved. Students look at material cycles and their role in life on his planet. In the carbon and nitrogen cycle the role of microorganisms such as decomposers and other bacteria are studied. The cycles include the water, carbon and nitrogen cycle. <b>Separate science students also investigate how water pollution can be assessed, food security</b></p>	<p><b>1A – Biological molecules</b> In this topic students learn about the different types of molecules that make up all cells and organisms, such as carbohydrates, amino acids, proteins and lipids. Includes the assessed practical; measuring the rate of an enzyme controlled reaction</p> <p><b>1B – More biological molecules</b> This topic continues to explore biological molecules and students learn about other molecules important to life processes, such as water, ATP, DNA/RNA and inorganic ions.</p> <p><b>2A – Cell Structure and Division</b> In this topic students build upon what they have learnt at GCSE. They learn about the eukaryotic cells and prokaryotic cells. Along with viruses and mitosis. This leads onto analysis of cell components which includes</p>	<p><b>7C – Populations in Ecosystems</b> In this topic students learn about the fact that living things can be found in places where they can cope with the conditions, ie temperature, and availability of food. This is a concept that students will have learned in KS4 but will now apply a range of new terminology and further deepen their knowledge. This topic is taught as the first year 13 topic as it builds on topic 4B. This topic includes the assessed practical, measuring biodiversity. This topic is divided into two as students need to have an understanding of photosynthesis and respiration to enable them to have a deeper understanding of succession and its effects and the applications of nutrient cycles.</p> <p><b>5A – Photosynthesis</b> Students learn about how plants and animals transfer</p>

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<p>practically investigate diffusion.</p>	<p><b>B10: Classification</b> Building upon KS2, students investigate how living organisms can be classified within the five kingdoms. Fossils are examined, as a way of visualising how species have changed over time.</p>	<p>start of Year 9, by looking in more depth about how substances are moved in and out of cells. Microscopes skills are developed further. We do not teach this unit in one block. It is broken into small topics, to allow for increased retrieval, review and linking.</p>		<p><b>and factors which affect decomposition.</b></p>	<p>the assessed practical; Preparing a root tip squash.</p>	<p>and release energy and the importance of it to their survival. There are assessed practical within this topics which gives students an opportunity to further improve practical techniques but also apply knowledge.</p>
<p><b>B4: Variation</b> Building upon student learning at KS2 and topic B2, students develop their ideas about species and variation. Including the inherited and environmental causes of variation. Graphical skills are developed, as students investigate the types of variation graphs.</p> <p><b>B5: What are health and disease?</b> Building upon KS2 learning on impact of various factors of body systems. They develop their ideas of what health means, including mental well-being. Students develop their understanding of nutrition and exercise on the body. Diseases focus on those caused by lifestyle and pathogens.</p>	<p><b>B11: Interdependence</b> Students build upon KS2 understanding of adaptations. They explore ecosystems, how organisms are suited to living in different ecosystems and feed relationships.</p> <p><b>B12: Photosynthesis and plant nutrition</b> Building upon and comparing to student understanding of the transport of nutrients and water in animals, we focus on nutrients and water movements within plants. This includes highly specialised tissue within the plant. Students build upon their understanding of plants making their own food, to investigate photosynthesis.</p>		<p><b>Genetics</b> Building on student KS3 knowledge, they develop their understanding of how gametes are produced by meiosis. They learn in more depth about the structure of DNA, including nucleotides. Mutations and how genes cause genetic variation is investigated. Whilst the reasons for why characteristics are passed down in families, built upon from KS3. The role of scientists working together is seen through the Human Genome Project. <b>Separate science students also study protein synthesis.</b></p> <p><b>Natural Selection</b></p>	<p><b>Animal co-ordination, control and homeostasis</b> Student focus on the endocrine system and study the affect the hormones on homeostasis in the body. Combined students' study about the organs in the endocrine system, the hormones they produce and the organs they target. Blood glucose control and the menstrual cycle studied. Linking to the menstrual cycles, students build their understanding about how different types of contraception work. Students consider type 1 and type 2 diabetes and look at the role of BMI in the risk factors associated with type 2 diabetes.</p>	<p><b>2B – Transport across cell membranes</b> This topic focuses on the cell membrane, both structure and function, Students learn about the process that move substances into and out of a cell, This is then applied to the assessed practical's; factors affecting the rate of osmosis and investigating cell membrane permeability.</p> <p><b>2C- Cells and the immune system</b> This topic builds upon what students have learnt about the structure of the membrane. It includes how the immune system works in the body. It also looks at how antibodies are used in medicine.</p> <p><b>3A- Exchange and transport Systems</b> Students further build upon their knowledge of the transport of substances and the cell membrane. Students learn that every organism has</p>	<p><b>5B – Energy transfer and nutrient cycles</b> This topic builds upon KS4 topics by student learning further about the nitrogen cycle and its effects along with the phosphorous cycle. Students then build their knowledge further by exploring faming and farming practices.</p> <p><b>7C Populations in ecosystems</b> Students then continue with the topic learning about succession and conservation.</p> <p><b>7B – Genetics</b> This topic is all about genes and how organisms pass them onto their offspring. Students build upon the genetic terms learned at KS4.</p> <p><b>7B – Populations and evolution</b> Students build upon topic 4B and learn about more types of selection and how new species have evolved.</p>

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<p><b>B6: Working together</b> Students build upon their learning about cells and start to investigate the wide range of specialised cells that are found in some animals and plants. They focus on how cells join to form tissues, organs and organ systems. This develops into building on their KS2 knowledge of the skeletons, where they increase their understanding of joints and muscles.</p>			<p>Students build upon their understanding of evolution and genetics, to study Darwin's theory of evolution by natural selection. They investigate different methods, including genetic analysis, which are being used to investigate evolution. This leads to understanding classification in more depths and gives students the ability to investigate topics such as selective breeding and genetic modification. <b>Separate science students also study how tissue cultures are taken, fertilisers and biological control.</b></p>	<p><b>Separate science students look at blood glucose control and the menstrual cycle in much more depth, investigating all the hormones and their roles. Building on the menstrual cycle, they look at ART (assisted reproductive technology). In addition, students investigate osmoregulation and the role of the kidney. This includes an in-depth understanding about how the kidney functions.</b></p>	<p>substances it needs to take in and others it needs to move out in order to survive. They learn that size and surface area affects how quickly this is done. This builds on what they learned at KS4. This topic includes the assessed practical, carrying out dissections. Students learn dissection skills.</p> <p><b>3B – More gas exchange systems</b> This topic is starts with digestion and absorption and students apply knowledge of enzymes. The topic then explores haemoglobin and leads into the circulatory system. Students go on to then learn about plant transport systems .</p>	<p><b>6A- Stimuli and Response</b> In this topic students learn about how organisms respond to their environment in order to survive. Students carry out the assessed practical which enables them to test the responses of an organism.</p> <p><b>6B- Nervous Coordination</b> This builds on B2 from GCSE and cell membranes from Year 12. Students learn in depth about the transmission of nerve impulses and how they are created.</p>
<p><b>B7: Body Systems</b> This topic focuses on organ systems within the human body. This builds on students learning about how organ systems and built and upon KS2 learning about the circulatory and digestive systems. Students will investigate the respiratory system, digestive system and circulatory system and</p>			<p><b>Health and disease</b> Student build on KS3 to understand what health means. They look at pathogens and the diseases they cause. How the spread of pathogens can be reduced or prevented. How the body is protected against infection and how the immune system works to</p>	<p><b>Transport systems</b> Students investigate how humans transport substances around their body and the need for efficient systems. They learn more about the role of diffusion in gas exchange. The circulatory systems and heart are studied in more depth. Cellular respiration</p>	<p><b>4A- DNA, RNA. And protein synthesis</b> Building on knowledge of biological molecules students learn how the DNA is stored in a cell leading to the synthesis of proteins.</p> <p><b>4B – Diversity and selection</b> Students learn about the production of gametes with a focus on genetic variation, including genetic mutations. Students further develop their</p>	<p><b>8A – Mutations and gene expression</b> This topic builds on topics in year 12. Students learn about the effect of mutations ie Cancer and the use of stem cells in medicine. Theyb also build further on previous knowledge of genes and proteins and learn about control of gene expression.</p> <p><b>8B – Genome projects and gene technologies.</b></p>

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<p>look at how the three systems link together. This topic includes a PSHE link, which focus on keep teeth healthy.</p>			<p>protect you if pathogens get into your body. Antibiotics are investigated and students looks at the development of medicines. Non-communicable diseases are investigated, include cardiovascular diseases and liver diseases.</p> <p><b>Separate science students also study the virus life cycle, plant disease and defences, antibiotics in more depth and monoclonal antibodies.</b></p> <p><b>Photosynthesis</b> Building upon KS3, students look at photosynthesis and how leaves are adapted for maximum photosynthesis. Factors that affect photosynthesis are investigated practically and in theory.</p>	<p>(including aerobic and anaerobic) is focused on and linked to transport within the body and diffusion of substances in and out of cells. <b>Separate science students focus in more depth on the rate of diffusion and learn Fick's Law.</b></p>	<p>understanding by being introduced to the process of natural selection. This is then applied to the effects of antibiotics by investigating selection which is as assessed practical.</p> <p><b>4C – Classification of organisms</b> Students learn how organisms are grouped together which makes it easier to study. This leads into learning how organisms are classified with a focus on courtship behaviour. Students then further develop their understanding by learning about biodiversity and use this knowledge to explore how agriculture affects biodiversity.</p>	<p>Students learn about how scientists work to determine the entire genome of an organism and further build upon their year 12 knowledge of DNA and genes. The topic also explores the use of recombinant DNA technology which builds upon a concept in KS4. Students also learn about the use of genes in medical diagnosis.</p>
			<p><b>Introduction to ecosystems</b> Students build upon their KS3 understanding to look at ecosystems, the level or organisation, abiotic and biotic factors and how these affect communities.</p>			

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This includes predator-prey relationships.

**Plant structure and function**

Students build on their work on photosynthesis to investigate plant structure in more detail. They focus on the rate of water uptake by a plant and how this is affected by different factors. They learn about transport in xylem and phloem vessels and how the reactants and products of photosynthesis are carried within the plant. This topic allows students to link specialised cells that link to photosynthesis and the transport of substances through the plant. **Separate science students focus in more depth on transpiration and the factors affecting its rate. Plant hormones and their uses are studied, including phototropism.**