



## Curriculum Map for Science Biology Year 13

YEAR 13	Autumn 1	Autumn 2
<b>Topics</b>	<b>Genetics, Populations, Evolution &amp; Ecosystems</b>	<b>Organisms &amp; How They Respond To Changes In Their Environment (Response to Stimuli)</b>
<b>Substantive Knowledge – The Knowledge and Content Taught By The Teacher</b>	<ul style="list-style-type: none"><li>Students will learn how all living things have the capability of passing some of their characteristics to the next generation.</li><li>They will learn why this is important for any species that exists on Earth.</li><li>Students will learn about the probability of certain characteristics appearing in offspring and why species change over time. They will focus in on why species change over time and why some species exist now that didn't exist in the past.<ul style="list-style-type: none"><li>Students will study ecology and how all organisms are part of an ecosystem that depends on a combination of other organisms and non-living factors in their surroundings.</li></ul></li></ul>	<ul style="list-style-type: none"><li>Students will learn what an ecosystem is and how and why organisms depend on each other.</li><li>Students will learn that organisms are dependent, directly or indirectly, on the Sun as a source of energy to make food and we focus on this over the topic.</li><li>Students will look at some of the ways animals and plants respond to change.</li><li>Students will learn about the benefits of being multicellular and the ability to have specialised cells and organs or organ systems. This will link to the nervous system.</li><li>Students will learn about homeostatic mechanisms.</li></ul>
<b>Disciplinary Knowledge – The Knowledge Scientists Need So They Can Collect, Understand and Evaluate Scientific Evidence</b>	<ul style="list-style-type: none"><li>Gregor Mendal and the History of Genetics</li><li>Charles Darwin and the Theory of Evolution/Natural Selection</li><li>Succession Theory</li></ul>	<ul style="list-style-type: none"><li>Control of Heart Rate and the Diseases</li><li>The History of the Heart</li><li>Drugs and Stimulation/Suppression of the Synapses</li><li>Diabetes - Discovery, Hormonal Control, Treatment and Search for a Cure</li></ul>
<b>Skills</b>	<ul style="list-style-type: none"><li>Students will investigate genetic ratios using crosses of Drosophila or Fast Plant.</li><li>Students will show understanding of the probability associated with inheritance.</li><li>Students will collect data about the frequency of observable phenotypes within a single population.</li><li>Students will apply their knowledge of sampling to the concept of genetic drift.</li><li>Students will devise an investigation to mimic the effects of random sampling on allele frequencies in a population.</li><li>Students will use computer programs to model the effects of natural selection and of genetic drift.</li></ul>	<ul style="list-style-type: none"><li>Students will be given data from which to calculate gross primary production and to derive the appropriate units.</li><li>Students will carry out investigations to find the dry mass of plant samples or the energy released by samples of plant biomass.</li><li>Students will be given data from which to calculate the net productivity of producers or consumers from given data and the efficiency of energy transfers within ecosystems.</li><li>Students will be given data from which to calculate percentage yields.</li></ul>

	<ul style="list-style-type: none"> <li>Students will use turbidity measurements to investigate the growth rate of a broth culture of microorganisms.</li> </ul>	<ul style="list-style-type: none"> <li>Students will devise investigations into the effect of named minerals on plant growth.</li> <li>Students will design and carry out investigations into the effects of indoleacetic acid on root growth in seedlings.</li> </ul>
<b>Links To Prior Learning</b>	<ul style="list-style-type: none"> <li>Monohybrid Inheritance - introduced and developed throughout Years 7 to 11.</li> <li>Natural Selection - introduced and developed throughout Years 7 to 11.</li> <li>Populations in Ecosystems - topic covered and introduced in GCSE ecology unit.</li> </ul>	<ul style="list-style-type: none"> <li>Food Chains and Webs - Year 7.</li> <li>Reflexes and Receptors - introduced at GCSE level.</li> <li>Nerve Coordination - introduced at GCSE, synapses covered in GCSE Biology only.</li> <li>Homeostasis and Control - introduced at GCSE both in Combined and Triple.</li> </ul>
<b>Literacy/ Numeracy</b>	<ul style="list-style-type: none"> <li>Numeracy - Phenotypic Ratios, Probability and Inheritance, Chi Squared Tests and Hardy Weinberg</li> </ul>	<ul style="list-style-type: none"> <li>Numeracy - Calculating Gross Primary Production, Net Primary Production Calculations, Percentage Yield and Cardiac Output Calculations</li> </ul>
<b>Cross Curricular</b>	<ul style="list-style-type: none"> <li>History - Medicine Through Time</li> <li>Geography - Natural Selection</li> <li>Philosophy &amp; Ethics - Link Between Evolution and Creationism</li> </ul>	<ul style="list-style-type: none"> <li>PE - Reflexes and Muscle Control</li> <li>PSHE - Healthy Diet and Diabetes</li> <li>PE - Skeletal Muscle Control</li> </ul>
<b>Assessment</b>	<ul style="list-style-type: none"> <li>Genetics, Populations, Evolution and Ecosystems Assessment</li> </ul>	<ul style="list-style-type: none"> <li>Organisms Respond to Changes in their Environment Assessment</li> </ul>

<b>YEAR 13</b>	<b>Spring 1 &amp; 2 Summer 1</b>
<b>Topics</b>	<b>Gene Expression and Recombinant DNA Technology</b>
<b>Substantive Knowledge – The Knowledge and Content Taught By The Teacher</b>	<ul style="list-style-type: none"> <li>Students will learn about gene expression and that if DNA controls the functions of a cell and all the cells in your body have the same DNA, then how can these cells have different functions? What could cause one of these cells to become cancerous?</li> <li>Students will learn about recombinant DNA technology. They will learn about the uses of this technology in medicine (understanding more about how the genome works) and in improved food production.</li> </ul>
<b>Disciplinary Knowledge – The Knowledge Scientists Need So They Can Collect, Understand and Evaluate Scientific Evidence</b>	<ul style="list-style-type: none"> <li>Development of gene expression study and cancer.</li> <li>Development of epigenetics and the impact on society.</li> <li>Recombinant DNA technology and the link to vaccines/treatments for diseases.</li> <li>Genetic counselling and screening - history, morals and ethical considerations.</li> </ul>

<b>Skills</b>	<ul style="list-style-type: none"> <li>• Students will produce tissue cultures of explants of cauliflower (<i>Brassica oleracea</i>).</li> <li>• Students will investigate the specificity of restriction enzymes using extracted DNA and electrophoresis.</li> <li>• Students will use gel electrophoresis to produce 'fingerprints' of food dyes.</li> </ul>
<b>Links To Prior Learning</b>	<ul style="list-style-type: none"> <li>• Gene Mutations - GCSE Biology</li> <li>• Transcription and Translation - Year 12 Biology</li> </ul>
<b>Literacy/ Numeracy</b>	<ul style="list-style-type: none"> <li>• Literacy - bringing it all together - looking at synoptic technique on answering questions in Paper 3 (the paper which covers all content across A-Level Biology).</li> <li>• Numeracy - analysis of experiments, graph work and calculations based around synoptic topics.</li> </ul>
<b>Cross Curricular</b>	<ul style="list-style-type: none"> <li>• Philosophy &amp; Ethics - Morals and Ethics of Genetic Therapy and Counselling</li> <li>• History - Medicine Through Time (DNA link)</li> </ul>
<b>Assessment</b>	<ul style="list-style-type: none"> <li>• Gene Expression and Recombinant DNA Technology Assessment</li> <li>• Preparation for Y13 External Assessment</li> </ul>