

# KS4 Long Term Curriculum Plan: Year 11 Separate Science

**Curriculum Aim:** In Science we aim to prepare students for their GCSE exams whilst also allowing students to be able to understand and interpret the world that they live in. GCSE Separate Science prepares students to leave school with a strong understanding of how science works as well as preparing them for future careers, courses and employment in science.

**Link to prior learning:** This course will build on the knowledge and skills developed during study in Year 10. They will also develop their practical, problem solving and investigative skills.

**Rationale of sequencing:** The topics have been ordered in a way that allows them to build on prior skills and knowledge.

|          | Focus / Topic                       | Knowledge & Skills (from NC/Programmes of Study)  | Assessment  |
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| Autumn 1 | <b>C8</b> Rates and equilibrium     | <p><b>C8</b>Define rate of reaction and be able to calculate mean rate of reaction.<br/>Describe how changing surface area, temperature and concentration affect rate of reaction.<br/>Describe the effect of a catalyst in affecting the rate of reaction.<br/>Write a word equation for familiar reversible reactions.<br/>Use Le Chatelier's principle to predict the effect of rate of reaction when conditions of a dynamic equilibrium are changed. (H).</p>  | Question-led lessons to develop skills to answer 6 mark questions in science. |
|          | <b>P8</b> Forces in balance         | <p><b>P8</b>Draw a scale diagram to represent a single vector.<br/>Give examples of contact and non-contact forces using diagrams to show the forces.<br/>Calculate the resultant force acting on an object.<br/>Describe an experimental technique to determine the centre of mass of an object.<br/>Investigate non-parallel forces acting on a system in equilibrium to verify the parallelogram of forces. (H)<br/>To be able to calculate moments. (T)</p>   |   |
|          | <b>B10</b> The human nervous system | <p><b>B10</b>Define homeostasis.<br/>Describe how information is passed along neurons.<br/>Identify reflex reactions and describe the events involved in a reflex action.<br/>Describe the brain and the eye and explain common problems with the eye. (T)</p>  |   |
|          | <b>B11</b> Hormonal coordination    | <p><b>B11</b>State the role of hormones released by endocrine glands.<br/>Describe the differences between Type 1 and Type 2 diabetes and identify treatments for both.<br/>Interpret diagrams of negative feedback.<br/>Describe what happens during the menstrual cycle.<br/>Categorise contraceptives as hormonal and non-hormonal listing advantages and disadvantages of each.<br/>Describe how FSH and IVF can be used to treat fertility. (H)<br/>Explain plant hormones and how they can be of use. (T)</p> |   |

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| Autumn 2 | <p><b>B12</b>Homeostasis in action</p> <p><b>B13</b>Reproduction</p> <p><b>C9</b>Crude oil and fuels</p> <p><b>C10</b>Organic Reactions</p> <p><b>C11</b>Polymers</p> <p><b>C12</b>Chemical analysis</p> <p><b>P9</b>Motion</p> <p><b>P10</b>Forces and motion</p> | <p><b>B12</b>How we control our body temperature.(T)<br/>How waste products are removed from the body.(T)<br/>How the human kidney and dialysis works. (T)</p> <p><b>B13</b>Describe the differences between sexual and asexual reproduction.<br/>Describe the processes of mitosis and meiosis.<br/>Describe the relationship between DNA, genes, and chromosomes.<br/>Recognise examples of inherited traits.<br/>Use Punnett squares to show sex inheritance and inherited disorders such as cystic fibrosis,<br/>Outlines methods used to screen embryos.<br/>DNA structure and protein synthesis (T)<br/>Gene expression and mutation. (T)</p> <p><b>C9</b>Describe how to separate crude oil into its fractions.<br/>Define hydrocarbons and alkanes.<br/>Recognise trends in colour, viscosity, flammability, and boiling point as hydrocarbon chain length changes.<br/>Write equations for the combustion of hydrocarbons.</p> <p><b>C10</b>Explain reactions of alkenes. (T)<br/>Describe the structures of alcohols, carboxylic acids and esters. (T)<br/>Describe reactions and uses of alcohols.(T)</p> <p><b>C11</b>Describe addition polymerisation and condensation polymerisation. (T)<br/>Describe what natural polymers are and DNA(T)</p> <p><b>C12</b>Describe the difference between pure substances, impure substances, and formulations.<br/>Calculate R<sub>f</sub> values from given data.<br/>Safely carry out the laboratory tests for hydrogen, oxygen, carbon dioxide, and chlorine.<br/>How to test for positive and negative ions (T)<br/>Describe flame emission spectroscopy. (T)</p> <p><b>P9</b>Use gradients of distance-time graphs to compare the speeds of objects.<br/>Describe the difference between speed and velocity.<br/>Recall and rearrange equations relating velocity, acceleration, and time.<br/>Describe sections of velocity-time graphs</p> <p><b>P10</b>Describe the effect of changing the mass or the force acting on an object on its acceleration,<br/>Calculate the weight of objects from their mass and gravitational field strength,</p> | PPEs. |
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|          |   | <p>Categorise the factors affecting thinking distance and braking distance.<br/> Use <math>p=mv</math> to calculate the momentum, mass or velocity of an object, (H)<br/> State Hooke's law.<br/> To understand conservation of momentum, impact forces and why car safety is so important. (T)</p>  |   |
| Spring 1 | <p><b>B14</b>Variation and evolution</p> <p><b>C13</b>The Earth's atmosphere</p> <p><b>P11</b>Forces and Pressure</p> <p><b>P12</b>Wave properties</p> <p><b>P13</b>Electromagnetic waves</p> | <p><b>B14</b>List examples of human variation.<br/> Describe the steps that take place during evolution by natural selection.<br/> Explain the process of selective breeding.<br/> Give examples of GM organisms and describe why they are useful to humans,<br/> Outline the potential risks and benefits of genetic engineering.<br/> Adult cell cloning. (T)</p> <p><b>C13</b>State the composition of the Earth's early atmosphere.<br/> Describe how the proportion of carbon dioxide in the early atmosphere was reduced,<br/> Explain the greenhouse effect and link it to human activity.<br/> Describe the impacts of atmospheric pollutants.</p> <p><b>P11</b>Explain pressure and surfaces included pressure in a liquid at rest.<br/> Explain atmospheric pressure and upthrust and floatation. (T)</p> <p><b>P12</b>Compare transverse and longitudinal waves.<br/> Calculate the period of a wave from its frequency.<br/> Describe refraction and reflection.<br/> Describe sound waves and seismic waves.<br/> State uses of ultrasound. (T)</p> <p><b>P13</b>Identify the position of EM waves in the spectrum in order of wavelength and frequency.<br/> State the uses of different types of EM wave.<br/> Compare X-rays and gamma rays.<br/> Describe ionisation in terms of atoms.<br/> State some safety procedures associated with X-rays.</p> | Question-led lessons to develop skills to answer 6 mark questions in science. |
| Spring 2 | <p><b>B15</b>Genetics and evolution</p> <p><b>C14</b>The Earth's resources</p>  | <p><b>B15</b>Describe how fossils are formed.<br/> State what is meant by extinction.<br/> Describe how antibiotic resistant bacteria evolve.<br/> Describe the classification system developed by Carl Linnaeus to include the order of the taxonomic groups.<br/> Describe how organisms are divided in the three domain system.<br/> The history of genetics (T)<br/> Different theories around evolution and details about evolution and speciation. (T)</p> <p><b>C14</b>Describe resources as finite or renewable.<br/> Describe the importances of potable water.</p>   | March PPEs  |

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|                 | <p><b>C15</b>Using our resources</p> <p><b>P14</b>Light</p> <p><b>P15</b>Electromagnetism</p> <p><b>P16</b>Space</p>                                 | <p>Describe the main processes in sewage treatment.<br/>         Explain the processes of phytomining and bioleaching. (H)<br/>         State the different stages of a Life Cycle Assessment.<br/>         Explain the importance of reusing and recycling products.</p> <p><b>C15</b>Describe rusting. (T)<br/>         Describe what an alloy is. (T)<br/>         Describe the properties of polymers, glass, ceramics and composites. (T)<br/>         Explain the Haber process. (T)<br/>         How to make fertilisers in the lab and in industry. (T)</p> <p><b>P14</b>Explain reflection and refraction of light. (T)<br/>         Explain how we see colour. (T)<br/>         Explain what lenses are and how they can be used. (T)</p> <p><b>P15</b>Sketch the shape of a magnetic field around a bar magnet.<br/>         Describe the effect of increasing the current on the magnetic field around a wire.<br/>         Apply Fleming's left hand rule to determine the direction of the force acting on a conductor. (H)<br/>         Explain how electromagnets are used in devices. (T)<br/>         The generator effect and an alternating current generator (T)<br/>         Explain how transformers work. (T)</p> <p><b>P16</b>Describe the formation of the solar system. (T)<br/>         Explain the life history of a star.(T)<br/>         To understand orbits. (T)<br/>         Describe the explaining universe and the beginning and future of the universe. (T)</p> |  |
| <p>Summer 1</p> | <p><b>B16</b> Adaptation, interdependence, and competition</p> <p><b>B17</b>Organising an ecosystem</p> <p><b>B18</b>Biodiversity and ecosystems</p> | <p><b>B16</b>Define community, population, habitat, ecosystem, biotic factors, and abiotic factors.<br/>         Explain how to use a quadrat and transect to estimate population size.<br/>         List resources that animals and plants compete for.<br/>         Explain how adaptations allow an organism to survive in its habitat.</p> <p><b>B17</b>Identify producers, consumers, predators, and prey in a food web.<br/>         Explain why decomposers are important to a stable ecosystem.<br/>         Describe the events in the carbon cycle.<br/>         Explain the rates of decomposition. (T)</p> <p><b>B18</b>Describe why a good level of biodiversity is important to the future of humankind.<br/>         State some substances that pollute water and land.<br/>         Describe the formation of acid rain.<br/>         Explain the effects of deforestation and peat bog removal.<br/>         Describe the consequences of global warming.</p>  |  |

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|  |  | Explain trophic levels of biomass and biomass transfers. (T)<br>Describe how we can make food production more efficient and sustainable. (T)<br>Discuss the impact climate change is having on the planet. (T) |  |
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#### Further Information

AQA Specification: <https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464>

Chace GCSE Science website: <https://sites.google.com/chace.enfield.sch.uk/year11revision>

Seneca: <https://senecalearning.com/en-GB/>

Sparx science: <https://sparxscience.com/>

BBC bitesize: <https://www.bbc.co.uk/bitesize/examspecs/z8r997h>