

# KS4 Long Term Curriculum Plan: Combined Science/Year 11 2021-2022

## 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 combined 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 and KS3, 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 the following topics skills (spiral sequencing).

	Focus / Topic	Knowledge & Skills (from NC/Programmes of Study)	Assessment
Autumn 1	<p><b>B9</b> Respiration  <b>B10</b> The human nervous system  <b>Homeostasis and response</b>                      (B11 Hormonal control in animals and plants, B12 Reproduction)  <b>B13</b> Variation and evolution</p>	<p><b>B9</b> To be able to compare the processes of aerobic and anaerobic respiration including the reactants, products and the energy transfers. To be able to calculate breathing rate in an investigation into the effects of exercise on the body.  <b>B10</b> To be able to explain the structure of the nervous system and its function and to carry out an investigation into reaction times and to use numerical data to show trends.  <b>Homeostasis and response</b> To be able to describe the principles of hormonal coordination in the human body and be able to identify the different endocrine glands. To evaluate information around the relationship between obesity and diabetes, and make recommendations taking into account social and ethical issues. To be able to show why issues around contraception cannot be answered by science alone.  <b>B13</b> to know that sexual reproduction involves the joining (fusion) of male and female gametes. To be able to complete a genetic diagram to show the likelihood of genetic traits being passed onto offspring and to appreciate that embryo screening and gene therapy may alleviate suffering but consider the ethical issues which arise.</p>	<p><b>B9, B10, B11, B12, B13</b> End of topic test.</p> <p>Required Practicals:  <b>B10:</b> Reaction times</p>
Autumn 2	<p><b>B14</b> Genetics and evolution  <b>B15</b> Adaptation, interdependence and competition  <b>B16</b> Organising an ecosystem  <b>B17</b> Biodiversity and ecosystems</p>	<p><b>B14</b> To be able to explain the benefits and risks of selective breeding given appropriate information and consider related ethical issues. To be able to use data to support the theory of evolution and to be able to extract and interpret information from charts, graphs and tables to support this. To appreciate why the fossil record is incomplete and understand how scientific methods and theories develop over time.  <b>B15</b> To be able to understand how scientific methods and theories develop over time and to interpret evolutionary trees.  <b>B16</b> To be able to record first-hand observations of organisms and extract and interpret information from charts, graphs and tables.  <b>B17</b> To be able to interpret and explain the processes in diagrams of the carbon cycle, the water cycle and to explain how waste, deforestation and global warming have an impact on biodiversity. To be able to discuss and understand the conflict between the need for cheap available compost to increase food production and the need to conserve peat bogs and peatlands as habitats for biodiversity and to reduce carbon dioxide emissions.</p>	<p><b>B14</b> End of topic test</p> <p>Required Practicals:  <b>B15:</b> Field investigations</p>

Spring 1	<p><b>C8</b> Rates and equilibrium  <b>C9</b> Crude oils and fuel  <b>Forces</b> (P8 Forces in motion, P9 Motion, P10 Force and motion)</p>	<p><b>C8</b> To investigate the factors that can affect the rate of a chemical reaction and link this to collision theory. Calculate the mean rate of a reaction. Draw and interpret graphs and draw tangents to calculate the rate of reaction and gradient.  <b>C9</b> To investigate the properties of different hydrocarbons and to have knowledge of their trends and to balance combustion equations and calculate the products gained from cracking large hydrocarbons.  <b>P8</b> Resultant force, resolving forces and using a parallelogram of forces.  <b>P9 &amp; P10</b> Distance time graphs and velocity time graphs, gain understanding of what displacement and other vector quantities. Terminal velocity and what can affect stopping distance. To be able to use ratios and proportional reasoning to convert units and complete rates. To be able to calculate acceleration, velocity and the resultant force.</p>	<p><b>C8,C9,C10.P8,P9,P10</b> End of topic test.</p> <p>Required Practicals:  <b>C8:</b> Rates of reaction  <b>C10:</b> Chromatography  <b>Forces:</b> Force and extension, Acceleration</p>
Spring 2	<p><b>C10</b> Chemical analysis  <b>C11</b> The Earth's atmosphere  <b>Waves</b> (P11 Wave properties, P12 Electromagnetic waves, P13 Electromagnetism)</p>	<p><b>C10</b> To be able to identify formulations, distinguish pure from impure substances and explain the methods behind identifying a number of gasses. To be able to interpret chromatograms and determine R<sub>f</sub> values.  <b>C11</b> To be able to explain the Earth's early atmosphere and compare it to the present day. To be able to evaluate different scientific theories and explain the reasons for these changes using chemistry to support your answer.  <b>Waves</b> To be able to describe the difference between transverse and longitudinal waves and what they are used for. To be able to describe the properties and the uses of the different waves on the electromagnetic spectrum. To be able to calculate the wave speed using a ripple tank. To successfully apply formulas to calculate wave speed, frequency and wavelength. To be able to use Fleming's left hand rule to correctly calculate the fore, current and magnetic field.</p>	<p><b>C11,C12, P11,P12, P13</b> End of topic test.</p> <p>Required Practicals  <b>P11</b> Waves</p>
Summer 1	<p><b>C12</b> The Earth's resources</p>	<p><b>C12</b> To be able to describe the greenhouse effect and the interaction of short and long wavelength radiation. To be able to evaluate the impact of human behaviour.</p>	<p>Required Practicals:  <b>C12:</b> Water purification</p>
Summer 2	<p>Revision</p>	<p>Revision  Targeted revision will be completed with students after analysis of PPE exams.</p>	<p>GCSE Exams  6 exams (each 1.25hrs)</p>

#### 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/>

Kerboodle: <https://www.kerboodle.com/users/login>

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