

## Curriculum Statement for GCSE Science

**Subject Overview:** The majority of students will study either a double science pathway, gaining GCSE certification in Science A and Additional Science A . Soem students will achieve a 3rd award of Further Additional Science. The science subjects will be taught within the allocated science lessons to years 9, 10 & 11 and therefore not impact on option choices for other subjects.

### Assessment

All three science awards include elements of independent study (coursework) and exams, leading to two or three separate GCSE awards.

Each GCSE subject has a 25% coursework element incorporating a detailed and independent practical investigation into contemporary scientific topic, time has been set aside to develop these skills through both key stage 3 & 4. The rest of the marks (75%) are made up with exams sat at the end of year. Pupils study the OCR 21st Century Science Suite A syllabus.

Key topics:	Key skills taught across all 3 GCSE's
<p><b>GCSE Science - Students learn about Biology</b></p> <p>B1 You and your genes. The module covers genetics, inherited and environmental characteristics, cloning, gene therapy.</p> <p>B2 Keeping Healthy. The module covers; how our bodies fight disease, vaccines and vaccine policies, the heart and circulation</p> <p>B3 Life on Earth. The module covers; food chains, energy transfers, carbon cycle, evolution, natural selection, selective breeding, biodiversity and sustainability.</p> <p><b>Chemistry</b></p> <p>C1 Air Quality. The module covers; The evolution of our atmosphere, Pollution and Pollutants, Reducing Pollution, complete and incomplete combustion.</p> <p>C2 Material choices. The module covers; natural and synthetic materials, polymers and polymerisation, modifying polymers and nanotechnology.</p>	<p><b>Students learn the following skills in 6 areas</b></p> <p><b>Data: their Importance and limitations</b></p> <ul style="list-style-type: none"> <li>• use data rather than opinion if asked to justify an explanation</li> <li>• outline how a proposed scientific c explanation has been (or might be) tested, referring appropriately to the role of data.</li> <li>• suggest reasons why a given measurement may not be the true value of the quantity being measured.</li> <li>• suggest reasons why several measurements of the same quantity may give different values</li> <li>• when asked to evaluate data, make reference to its repeatability and/or reproducibility.</li> <li>• calculate the mean of a set of repeated measurements</li> <li>• from a set of repeated measurements of a quantity, use the mean as the best estimate of the true value</li> <li>• explain why repeating measurements leads to a better estimate of the quantity.</li> <li>• from a set of repeated measurements of a</li> </ul>

<p>C3 Chemicals in our lives: Risks and benefits. The module covers; minerals and natural resources, properties, uses and manufacture of salts, alkali production and Life cycle assessments.</p> <p><b>Physics</b></p> <p>P1 The Earth in the Universe. The module covers; space and the Big Bang, geology and continental drift theory, properties of waves.</p> <p>P2 Radiation and life. The module covers; properties and uses of the electromagnetic spectrum, Carbon Cycle &amp; Climate Change, digital and analogue waves.</p> <p>P3 Sustainable Energy. The module covers; energy efficiency &amp; reducing energy demands, generating electricity, calculating power and energy costs.</p>	<p>quantity, make a sensible suggestion about the range within which the true value probably lies and explain this</p> <ul style="list-style-type: none"> <li>• when discussing the evidence that a quantity measured under two different conditions has (or has not) changed, make appropriate reference both to the difference in means and to the variation within each set of measurements.</li> <li>• identify any outliers in a set of data</li> <li>• treat an outlier as data unless there is a reason for doubting its accuracy</li> <li>• discuss and defend the decision to discard or to retain an outlier.</li> </ul> <p><b>Cause Effect Explanations -</b></p> <ul style="list-style-type: none"> <li>• in a given context, suggest how an outcome might alter when a factor is changed.</li> <li>• identify, in a plan for an investigation of the effect of a factor on an outcome, the fact that other factors are controlled as a positive design feature, or the fact that they are not as a design flaw</li> <li>• explain why it is necessary to control all the factors that might affect the outcome other than the one being investigated.</li> <li>• suggest and explain an example from everyday life of a correlation between a factor and an outcome</li> <li>• identify where a correlation exists when data are presented as text, as a graph, or in a table.</li> <li>• identify, and suggest from everyday experience, examples of correlations between a factor and an outcome where the factor is (or is not) a plausible cause of the outcome</li> <li>• explain why an observed correlation between a given factor and outcome does not necessarily mean that the factor causes the outcome.</li> <li>• suggest factors that might increase the chance of a particular outcome in a given situation, but do not invariably lead to it</li> <li>• explain why individual cases do not provide</li> </ul>
<p><b>GCSE Additional Science - Students learn about</b></p> <p><b>Biology</b></p> <p>B4 The processes of life. The module covers; plant, animal and microbial cell structure, enzymes, aerobic and anaerobic respiration, photosynthesis, diffusion, osmosis and active transport.</p> <p>B5 Growth and development. The module covers; the development of organisms, mitosis vs meiosis, fertilisation, stem cells, differentiation in plants.</p> <p>B6 Brain and Mind. The module covers; the Central Nervous systems, reflexes and conditioning and memory</p> <p><b>Chemistry</b></p> <p>C4 Chemical Patterns. The module covers; The development and patterns of the Periodic table, atomic structure, properties and uses of Group 1 &amp; Group 7 elements, writing and balancing</p>	

<p>chemical equations and ionic Bonding.</p> <p>C5 Chemicals of the Natural environment. The module covers; Chemicals of the Atmosphere, Lithosphere &amp; Hydrosphere, precipitation reactions, Ions and Electrolysis.</p> <p>C6 Chemical Synthesis. The module covers; Chemicals and hazards, neutralisation, percentage yield, relative atomic mass, titrations and factors affecting the rates of reaction.</p> <p><b>Physics</b></p> <p>P4 Explaining Motion. The module covers; forces and motion, motion graphs, momentum, changes in momentum, safety features, work done and energy transferred.</p> <p>P5 Electrical Circuits. The module covers; static electricity, electrical circuits, electromagnetic induction &amp; generators and transformers.</p> <p>P6 Radioactive Materials. The module covers; dangers &amp; uses of radiation, nuclear fusion vs nuclear fission and nuclear energy.</p>	<p>convincing evidence for or against a correlation.</p> <ul style="list-style-type: none"> <li>• evaluate critically the design of a study to test if a given factor increases the chance of a given outcome, by commenting on sample size and how well the samples are matched.</li> <li>• identify the presence (or absence) of a plausible mechanism as reasonable grounds for accepting (or rejecting) a claim that a factor is a cause of an outcome.</li> </ul> <p><b>Developing Scientific Explanations</b></p> <ul style="list-style-type: none"> <li>• recognise that an explanation may be incorrect even if the data agree with it.</li> <li>• identify where creative thinking is involved in the development of an explanation.</li> <li>• recognise data or observations that are accounted for by, or conflict with, an explanation</li> <li>• give good reasons for accepting or rejecting a proposed scientific explanation</li> <li>• identify the better of two given scientific explanations for a phenomenon, and give reasons for the choice..</li> <li>• draw valid conclusions about the implications of given data for a given scientific explanation,</li> </ul>
<p><b>Further Additional Science - - Students learn about</b></p> <p><b>Biology</b></p> <p>B7 Further Biology. The module covers; the muscular and skeletal systems, circulation, learning from ecosystems, fermentation and the developments of modern technologies.</p> <p><b>Chemistry</b></p> <p>C7 Further Chemistry. The module covers; The chemical industry health and safety, green chemistry, alkanes and alkenes, uses and properties of alcohols, exothermic, endothermic reactions and quantitative chemistry</p>	<p><b>The Scientific Community</b></p> <p>describe in broad outline the 'peer review' process, in which new scientific claims are evaluated by other scientists</p> <ul style="list-style-type: none"> <li>• recognise that there is less confidence in new scientific claims that have not yet been evaluated by the scientific community than there is in well-established ones.</li> <li>• identify the fact that a finding has not been reproduced by another scientist as a reason for questioning a scientific claim</li> <li>• explain why scientists see this as important.</li> <li>• show awareness that the same data might be interpreted, quite reasonably, in more than one way</li> </ul>

**Physics**

P7 Further Physics. The module covers; Studying the Universe, using lenses

and telescopes, behaviour of waves and the life cycle of stars.

- suggest plausible reasons why scientists in a given situation disagree(d).

- discuss the likely consequences of new data that disagree with the predictions of an accepted explanation

- suggest reasons why scientists should not give up an accepted explanation immediately if new data appear to conflict with it..

**Making Decisions about Science and Technology**

- in a particular context, identify the groups affected and the main benefits and costs of a course of action for each group

- suggest reasons why different decisions on the same issue might be appropriate in view of differences in social and economic context.

- use data (for example, from a Life Cycle Assessment) to compare the sustainability of alternative products or processes. .

- in contexts where this is appropriate, show awareness of, and discuss, the official regulation of scientific research and the application of scientific knowledge.

- distinguish questions which could in principle be answered using a scientific approach, from those which could not.

- where an ethical issue is involved:

- say clearly what this issue is

- summarise different views that may be held.

**Risk**

Explain why it is impossible for anything to be risk free

Identify examples of risks which arise from new technologies

Discuss a given risk taking into account the chances of it happening and consequences

Distinguish between perceived and calculated risk.

