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
GCSE Science - Students learn about **Biology** B1 You and your genes. The module covers genetics, inherited and environmental characteristics, cloning, gene therapy. B2 Keeping Healthy. The module covers; how our bodies fight disease, vaccines and vaccine policies, the heart and circulation B3 Life on Earth. The module covers; food chains, energy transfers, carbon cycle, evolution, natural selection, selective breeding, biodiversity and sustainability. **Chemistry** C1 Air Quality. The module covers; The evolution of our atmosphere, Pollution and Pollutants, Reducing Pollution, complete and incomplete combustion. C2 Material choices. The module covers; natural and synthetic materials, polymers and polymerisation, modifying polymers and nanotechnology.	**Students learn the following skills in 6 areas** **Data: their Importance and limitations** • use data rather than opinion if asked to justify an explanation • outline how a proposed scientific c explanation has been (or might be) tested, referring appropriately to the role of data. • suggest reasons why a given measurement may not be the true value of the quantity being measured. • suggest reasons why several measurements of the same quantity may give different values • when asked to evaluate data, make reference to its repeatability and/or reproducibility. • calculate the mean of a set of repeated measurements • from a set of repeated measurements of a quantity, use the mean as the best estimate of the true value • explain why repeating measurements leads to a better estimate of the quantity. • from a set of repeated measurements of a

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.

Physics

P1 The Earth in the Universe. The module covers; space and the Big Bang, geology and continental drift theory, properties of waves.

P2 Radiation and life. The module covers; properties and uses of the electromagnetic spectrum, Carbon Cycle & Climate Change, digital and analogue waves.

P3 Sustainable Energy. The module covers; energy efficiency & reducing energy demands, generating electricity, calculating power and energy costs.

GCSE Additional Science - Students learn about

Biology

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.

B5 Growth and development. The module covers; the development of organisms, mitosis vs meiosis, fertilisation, stem cells, differentiation in plants.

B6 Brain and Mind. The module covers; the Central Nervous systems, reflexes and conditioning and memory

Chemistry

C4 Chemical Patterns. The module covers; The development and patterns of the Periodic table, atomic structure, properties and uses of Group 1 & Group 7 elements, writing and balancing

quantity, make a sensible suggestion about the range within which the true value probably lies and explain this

• 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.

• identify any outliers in a set of data

• treat an outlier as data unless there is a reason for doubting its accuracy

• discuss and defend the decision to discard or to retain an outlier.

Cause Effect Explanations -

• in a given context, suggest how an outcome might alter when a factor is changed.

• 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

• explain why it is necessary to control all the factors that might affect the outcome other than the one being investigated.

• suggest and explain an example from everyday life of a correlation between a factor and an outcome

• identify where a correlation exists when data are presented as text, as a graph, or in a table.

• 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

• explain why an observed correlation between a given factor and outcome does not necessarily mean that the factor causes the outcome.

• suggest factors that might increase the chance of a particular outcome in a given situation, but do not invariably lead to it

• explain why individual cases do not provide

chemical equations and ionic Bonding.

C5 Chemicals of the Natural environment. The module covers; Chemicals of the Atmosphere, Lithosphere & Hydrosphere, precipitation reactions, Ions and Electrolysis.

C6 Chemical Synthesis. The module covers; Chemicals and hazards, neutralisation, percentage yield, relative atomic mass, titrations and factors affecting the rates of reaction.

Physics

P4 Explaining Motion. The module covers; forces and motion, motion graphs, momentum, changes in momentum, safety features, work done and energy transferred.

P5 Electrical Circuits. The module covers; static electricity, electrical circuits, electromagnetic induction & generators and transformers.

P6 Radioactive Materials. The module covers; dangers & uses of radiation, nuclear fusion vs nuclear fission and nuclear energy.

Further Additional Science - - Students learn about

Biology

B7 Further Biology. The module covers; the muscular and skeletal systems, circulation, learning from ecosystems, fermentation and the developments of modern technologies.

Chemistry

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

convincing evidence for or against a correlation.

• 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.

• 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.

Developing Scientific Explanations

• recognise that an explanation may be incorrect even if the data agree with it.

• identify where creative thinking is involved in the development of an explanation.

• recognise data or observations that are accounted for by, or conflict with, an xplanation

• give good reasons for accepting or rejecting a proposed scientific explanation

• identify the better of two given scientific explanations for a phenomenon, and give reasons for the choice..

• draw valid conclusions about the implications of given data for a given scientific explanation,

.**The Scientific Community**

describe in broad outline the 'peer review' process, in which new scientific claims are evaluated by other scientists

• recognise that there is less confidence in new scientific claims that have not yet been evaluated by the scientifi c community than there is in well-established ones.

• identify the fact that a finding has not been reproduced by another scientist as a reason for questioning a scientific c claim

• explain why scientists see this as important.

• show awareness that the same data might be interpreted, quite reasonably, in more than one way

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 c research and the application of scientific c 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.