SUBJECT: Science

Key Stage 3 Curriculum:

2020-21	Year 7	Year 8
Autumn 1	Chemistry 1 - Changes of state and separating mixtures. Key lab skills and safety procedures.	Physics 3 – The solar system, universe and weight
Autumn 2	Biology 1 - Cells, Systems and living processes.	Biology 3 – Reproduction and Respiration
Spring 1	Physics 1 – Forces and Waves	Chemistry 3 – Atoms, Elements and the periodic table
Spring 2	Chemistry 2 – Acids, Alkalis and Reactions	Biology 4 – Food chains, diseases and DNA.
Summer 1	Physics 2 – Energy and Light	Physics 4 – Pressure, materials and electrical circuits.
Summer 2	Biology 2 – Plant growth and reproduction	Chemistry 4 – The rock cycle and the atmosphere.

Key Stage 4 Curriculum:

2020-21	Year9	Year 10	Year 11
Autumn 1	Biology - Cell Biology	Biology – Bioenergetics Chemistry – The rate and extent of chemical change	Biology – Variation and evolution. Chemistry – Chemical quantities and calculations. Physics - Waves.

Autumn 2	Chemistry - Atomic Structure and the periodic table Physics – Particle model of matter.	Physics – Electricity and circuits Biology – Homeostasis and response.	Biology – Variation and evolution continued. Chemistry – Chemical quantities and calculations continued. Physics - Waves continued. Revision for paper 1 mock examination to be completed in December.
Spring 1	Biology - Organisation	Chemistry – Hydrocarbons and chemical analysis	Biology – Ecology in action Chemistry – The atmosphere and sustainable development. Physics – Electromagnets, motors and generators.
Spring 2	Chemistry – Hydrocarbons and chemical analysis	Physics – Structure of the atom and radioactivity	Biology – Ecology in action continued. Chemistry – The atmosphere and sustainable development continued. Physics – Electromagnets, motors and generators continued. Revision for paper 2 mock exam to be sat in March.
Summer 1	Physics – Structure of the atom and radioactivity. Chemistry – Sustainable development	Chemistry – Sustainable development Physics – Forces and their effects	Revision and External exams. Paper 1s – May
Summer 2	Preparation for end of year examination, reteaching and enrichment.	Physics – forces and their effects continued. Preparation for end of year examination, reteaching and enrichment.	External exam. Paper 2s - June

Key Stage 5: Biology Curriculum

2020-21	Year 12	Year 13
Autumn 1	**Topic: Module 2 - Foundations in Biology** Cells and their structure – microscopes , Enzymes Learners have the opportunity to study microscopy and understand a variety of different organelles and their structures. **Module 3 – Exchange and Transport** Gas exchange and transport in animals Learners study a range of different animals and plants. They will study their ventilation systems and their transport systems. They will also be comparing multicellular organisms to single celled organisms. Learners will be expected to apply this knowledge to new situations and related problems.	**Topic: Module 5 – Communication, homeostasis and energy** Communication and Homeostasis, Neuronal communication & Respiration Learners will be able to identify the structure and function of the different types of neurons. They will also be learning about the synapse and neuronal communication. Learners will also be learning about the principals of homeostasis and the physiological control and behavioural responses involved. Learners will be studying the need for cellular respiration and the structure of the mitochondria. They will learn where respiration takes place and the process involved. **Module 6 – Genetics. Evolution and Ecosystems** Ecosystems Learners will be able to demonstrate and apply their knowledge of understanding different ecosystems and how abiotic and biotic factors influence the types of animals living there.

Autumn 2	**Topic: Module 2 - Foundations in Biology** Cell division, stem cells and the plasma membrane	**Topic: Module 5 – Communication, homeostasis and energy** Communication and Homeostasis, Neuronal communication & Respiration & Photosynthesis

	Learners will have the opportunity to understand how cells divide. They will study in details mitosis and meiosis. Learners will also understand the different types of stem cells and their uses in medical Science. Alongside this, learners will be investigating the plasma membrane and will conduct a practical to test its permeability. **Module 3 – Exchange and Transport** Gas exchange and transport in plants Learners study a range of different animals and plants. They will study their ventilation systems and their transport systems. They will also be comparing multicellular organisms to single celled organisms. Learners will be expected to apply this knowledge to new situations and related problems.	Learners will continue to learn about homeostasis and the role in which the kidney plays in terms of regulating water levels. The structure and function of the human liver will also be studied. **Module 6 - Genetics. Evolution and Ecosystems** Population and sustainability Learners will study the factors that determine size of population and the interactions between populations. The management of ecosystems and the effects of human activities will also be studied.

Spring 1	**Topic: Module 2 – Foundations in Biology** Biological molecules Learners will be studying the different types of biological molecules important for A-level biology for example Water. They will need to use their knowledge and apply this to a variety of new situations. **Module 4 – Biodiversity, evolution & Disease** Communicable diseases, prevention and the immune system In this module learners will study the biodiversity of organisms and how they are classified. Learners also gain a greater	**Module 6 - Genetics. Evolution and Ecosystems** Population and sustainability continued **Module 5 – Communication, homeostasis and energy** Hormonal communication Learners will be studying the endocrine system and how hormones are used to communicate. They will learn the histology of the pancreas and how blood glucose concentration is regulated. They will also learn the potential treatments of diabetes mellitus.
	understanding of different pathogens and how they affect the immune system.	

Spring 2	**Topic: Module 2 – Foundations in Biology** Biological molecules Learners will be studying the different types of biological molecules important for A-level biology for example Water. They will need to use their knowledge and apply this to a variety of new situations. **Module 4 – Biodiversity, evolution & Disease** The immune system Learners will look in depth at the immune system and learn about difference defence mechanism. Learners will learn the structure and function of phagocytes and B/T lymphocytes. They will learn the difference between the primary and secondary immune system. Learners will also learn the function of the antibody and the important of antigens.	**Topic: Module 6 – Genetics, evolution and ecosystems** Genetics and evolution , Manipulating the genome Learners will be learning about genome sequencing and genetic engineering. They will learn the basic principles behind DNA sequencing and techniques. They will understand the principles behind genetic engineering and the techniques which have been used. **Module 5 - Communication, homeostasis and energy** Plants and animal responses Learners will study the role of plant hormones and how plants respond to different stimuli. Practical investigations into the effects of plant hormones will also be studied.
Summer 1	**Topic: Module 2 – Foundations in Biology** Biological molecules – Revision and introduce last few molecules. Learners will be studying the different types of biological molecules important for A-level biology for example Water. They	**Topic: Topic: Module 6 – Genetics, evolution and ecosystems** Cloning and Biotechnology, patterns of inheritance Learners should be able to explain the use of cloning and how to make clones. They should also be able to explain the arguments for and against

	will need to use their knowledge and apply this to a variety of new situations. **Module 4 – Biodiversity, evolution & Disease** Biodiversity Learners will be researching different sampling techniques and using practical investigations to collect random and non-random samples in the school field. Learners will also be interrupting Simpson's index of Diversity to calculate biodiversity of a habitat.	cloning. Biotechnology is an industrial use of living organisms and learners will explore common themes associated with biotechnology. **Module 5 - Communication, homeostasis and energy** The structure of the human brain and diseases affecting the brain will be studied. The coordination of responses by the nervous system and endocrine system will also feature during this unit.
Summer 2	**Module 4 – Biodiversity, evolution & Disease** Classification and Evolution Learners will be able to understand why classification is so important. They will be using the binomial system of naming species and the advantages of the system. The theory of evolution by natural selection will also be studies to include the contributions made by Darwin & Wallace. *Any other revision or recapping of topics of mock examinations will be completed during this period.*	External examinations & Revision

Key Stage 5: Chemistry Curriculum

2020-21	Year 12	Year 13
Autumn 1	**Topic: Module 2 – Foundations in chemistry** ••Atoms, compounds, molecules and equations ••Amount of substance This section builds directly from GCSE Science, starting with basic atomic structure and isotopes. Important basic chemical skills are developed: writing chemical formulae, constructing equations and calculating chemical quantities	**Topic: Module 5 – Physical chemistry and transition elements** ••Reaction rates and equilibrium (quantitative) ••pH and buffers This module provides a context for synoptic assessment and the subject content links strongly with the content encountered in Module 2: Foundations in chemistry and Module 3: Periodic table and energy. There are many opportunities for developing mathematical skills, including use of logarithms and exponents, when studying the content of this section and when carrying out quantitative practical work.
Autumn 2	**Topic: Module 2 – Foundations in chemistry** Acid–base and redox reactions ••Electrons, bonding and structure The role of acids, bases and salts in chemistry is developed in the context of neutralisation reactions. Finally, redox reactions are studied within the context of oxidation number and electron transfer.	**Topic: Module 5 – Physical chemistry and transition elements** ••Enthalpy, entropy and free energy ••Redox and electrode potentials ••Transition elements This module provides a context for synoptic assessment and the subject content links strongly with the content encountered in Module 2: Foundations in chemistry and Module 3: Periodic table and energy.

Spring 1	**Topic: Module 3 – Periodic table and energy** ••The periodic table and periodicity ••Group 2 and the halogens ••Qualitative analysis This module provides learners with a knowledge and understanding of the important chemical ideas that underpin the study of inorganic and physical chemistry	**Module 6 – Organic chemistry and analysis** ••Aromatic compounds ••Carbonyl compounds ••Carboxylic acids and esters This module provides a context for synoptic assessment and the subject content links strongly with the content encountered in Module 2: Foundations in chemistry and Module 4: Core organic chemistry.

Spring 2	**Topic: Module 3 – Periodic table and energy** Enthalpy changes ••Reaction rates and equilibrium (qualitative) There are opportunities for developing mathematical skills when studying enthalpy changes and reaction rates and when carrying out quantitative practical work.	**Module 6 – Organic chemistry and analysis** Nitrogen compounds ••Polymers ••Organic synthesis This module introduces several new functional groups and emphasises the importance of organic synthesis.
Summer 1	**Module 4 – Core organic chemistry** ••Basic concepts ••Hydrocarbons ••Alcohols and haloalkanes The module provides learners with a knowledge and understanding of the important chemical ideas that underpin the study of organic chemistry: This module also provides learners with an opportunity to develop important organic practical skills, including use of	**Module 6 – Organic chemistry and analysis** ••Chromatography and spectroscopy (NMR) This module also adds NMR spectroscopy to the instrumentation techniques used in organic and forensic analysis.

	Quickfit apparatus for distillation, heating under reflux and purification of organic liquids.	
Summer 2	**Module 4 – Core organic chemistry** ••Basic concepts Organic synthesis ••Analytical techniques (IR and MS) In the context of this module, it is important that learners should appreciate the need to consider responsible use of organic chemicals in the environment. Current trends in this context include reducing demand for hydrocarbon fuels, processing plastic waste productively, and preventing use of ozonedepleting chemicals.	**Revision for exams**

Key Stage 5: Physics Curriculum

2020-21	Year 12	Year 13

Autumn 1	**Topic: Module 2 – Foundations in Physics** Understanding of the common units and maths skills required to access the A-level course. **Topic: Module 4** - Electrons, waves and Photons Explain current, its unit and Kirchhoff's laws. Calculate mean drift velocity of charge carriers. Explain and calculate EMF. Explain and calculate resistivity	**Topic: Module 5** - Newtonian world and Astrophysics continued Demonstrate and apply knowledge of: • Simple harmonic oscillations • Gravitational fields • Newton's laws of gravitation • Planetary motion • GPE • Stars • Electromagnetic radiation from stars
Autumn 2	**Topic: Module 3** - Forces and Motion Understand and calculate motion in a variety of contexts using appropriate units and graphs where required. Explain and calculate acceleration taking into account external forces. Use understanding of forces to calculate work done, efficiency and power. **Topic: Module 4** - Electrons, waves and Photons Understand and be able to apply a range of rules to series and parallel circuits Understand and be able to make calculations on potential dividers. Electromagnetic waves, stationary waves and superposition of waves. Wave particle duality and the photoelectric effect.	**Topic: Module 6 - Particles and Medical Physics** Demonstrate and apply knowledge of: • Capacitors • Electric fields • Electric potential energy • Magnetic fields •
Spring 1	**Topic: Module 4 continued.**	**Topic: Module 6 continued.**

	Topic: Module 3 - Forces and Motion Describe and explain how materials behave when stretched or squashed including stress and strain. (Young's modulus.) Use Newton's laws of motion to explain movement, momentum and calculate force.	• Motion of charged particles • The nuclear atom • Fundamental particles • Radioactivity including Fission and Fusion • Using X-rays •
Spring 2	**Topic: Module 3 and 4 continued.**	**Topic: Module 6 continued.** • Diagnostic methods in medicine • Ultrasound
Summer 1	**Revision and preparation for internally assessed AS examinations.**	**Revision and preparation for external examinations.**
Summer 2	**Topic: Module 5 - Newtonian world and Astrophysics** Demonstrate and apply knowledge of: • Thermal equilibrium • Kinetic model of matter • Specific heat capacity • Ideal gas laws • Kinematics of circular motion • Centripetal force	**External Examinations.**