

Key Stage Three Science Curriculum Overview: Years 7 and 8

This curriculum aims to ensure that all Future Academies students become scientifically literate who are able to recognise the importance of rational explanation, capable of scientific analysis and knowledgeable about the contribution that the sciences make to our theoretical and practical understanding of the world. It is designed so that foundational concepts are introduced at the outset and are carefully built upon over three years, ensuring students develop an increasingly sophisticated and specialised understanding of the separate sciences. As such, students benefit from a coherent and cumulative curriculum that enables them to grasp increasingly specialised concepts and to develop a rigorous understanding of scientific knowledge. Each long term, students cover one topic from biology, chemistry and physics. There is a strong focus on retrieval practice and interleaving learning: each topic begins by explicitly returning to relevant prior learning and ends with an assessment and an interleaved test based on another topic. A practical skills assessment is placed at the end of the unit to enable students to connect their learning to a set of practical techniques and real-world applications. All too often, learning about science involves a series of disjointed lessons and unconnected information that is difficult to remember or fully understand. As such, a key principle of this curriculum is that the sciences can and should be taught through meaningful narratives that enable students to form long-term memories. This is seen through the explicit, planned-for links between relevant topics and an emphasis, where relevant, on the chronological development of scientific discoveries and theories, and of their cultural importance

	Autumn	Spring	Summer
YEAR 7	<p>Cells</p> <ul style="list-style-type: none"> - Cell structure - Microscopy - Specialisation/differentiation - Stem cells - Organisation - Mitosis <p>Particles</p> <ul style="list-style-type: none"> - Atomic structure and states of matter - Physical changes and state symbols - Separating mixtures: filtration and evaporation - Separating mixtures: chromatography <p>Energy</p> <ul style="list-style-type: none"> - Energy stores and systems - Energy transfers - Conservation/dissipation - Heat transfer and temperature - Renewable and non-renewable resources 	<p>The human body</p> <ul style="list-style-type: none"> - Diffusion - Digestion - Digestive enzymes - The heart - Blood vessels <p>Atoms</p> <ul style="list-style-type: none"> - Atoms, elements, compounds and mixtures - Masses and charges of atoms - Development of the atomic model - The periodic table - The development of the periodic table - Electronic structure - Groups 1/7/0 <p>Forces</p> <ul style="list-style-type: none"> - Contact/non-contact - Gravity - Resultant forces - Forces and elasticity - Speed - Newton's first law: motion 	<p>Ecology</p> <ul style="list-style-type: none"> - Communities - Biotic/abiotic factors - Food chains - Trophic levels - Biomass <p>Acids and alkalis</p> <ul style="list-style-type: none"> - Conservation of mass and chemical equations - Acids and bases - Salts - Neutralisation - Strong and weak acids <p>Waves</p> <ul style="list-style-type: none"> - The nature of waves and their properties - The reflection of light - The refraction of light - Sound waves - Using waves for detection and exploration - Electromagnetic waves
YEAR 8	<p>Health and disease</p> <ul style="list-style-type: none"> - Prokaryotes and eukaryotes - Culturing/preventing microorganism growth - Coronary heart disease and health issues - Lifestyle and disease, and cancer - Communicable disease - Human defence systems - Vaccination, antibiotics and painkillers <p>Metals</p> <ul style="list-style-type: none"> - Metals/non-metals - Group 1 - Metallic bonding - Properties of metals and alloys - Metal reactivity - The reactions of metals and acids <p>Motion</p> <ul style="list-style-type: none"> - Resultant forces - Work done and energy transfer - Scalar and vector quantities - Forces and motion (mass and acceleration) 	<p>Reproduction</p> <ul style="list-style-type: none"> - Mitosis - Human reproduction - Hormones in reproduction - Meiosis - Sexual and asexual reproduction - Advantages and disadvantages of sexual and asexual reproduction <p>Non-metals</p> <ul style="list-style-type: none"> - Chemical bonding - Covalent bonding - Properties of small molecules and giant covalent structures - Structure and bonding in carbon molecules <p>Energy and matter</p> <ul style="list-style-type: none"> - Energy changes in systems - Particle model and changes in state - Internal energy and energy transfers - Particle model and pressure - Pressure 	<p>Genetics/inheritance</p> <ul style="list-style-type: none"> - Chromosomes and DNA - Inheritance - Inherited disorders - Sex determination - Variation - Genetics <p>Organic chemistry</p> <ul style="list-style-type: none"> - Fuels - Carbon compounds as fuels - Alkanes and alkenes - The reactions of alkenes and alcohols - Polymers <p>Space</p> <ul style="list-style-type: none"> - The solar system - Planets, orbits and satellites - The life cycle of a star - Red shift

Key Stage Three Science Curriculum Overview: Year 9

	Autumn	Spring	Summer
YEAR 9	<p>Cells</p> <ul style="list-style-type: none"> - Magnification practical calculations - Eukaryotic/Prokaryotic cells - Bacterial cells - Infection and response - Culturing microorganisms - Human defence systems - Vaccination - Antibiotics <p>Chemistry key ideas and metals</p> <ul style="list-style-type: none"> - Reactivity of metals - Periodic table - Chemical changes <p>Physics key ideas and particles</p> <ul style="list-style-type: none"> - Changing state - Specific heat capacity - Latent Heat - Energy transfers - Energy resources - Generating electricity 	<p>Plant biology</p> <ul style="list-style-type: none"> - Diffusion, osmosis and active transport - Plant organ systems - Photosynthesis - Photosynthesis required practical <p>Chemical changes</p> <ul style="list-style-type: none"> - Endothermic and exothermic reactions - Calculating energy changes - Neutralisation - Titration - Ionic bonding - Electrolysis <p>Electricity</p> <ul style="list-style-type: none"> - Circuits - Series and parallel circuits - Resistance and resistance of a wire practical - Domestic electricity - Magnets - Magnetic fields 	<p>Ecology</p> <ul style="list-style-type: none"> - Classification - Food chains and food webs - Pyramids of energy /pyramids of biomass - Decomposition - Cycling of matter - Field work - Maintaining biodiversity <p>Carbon chemistry</p> <ul style="list-style-type: none"> - Covalent bonding - Polymers - Diamond - Graphite - Graphene and fullerenes <p>Atoms and Isotopes</p> <ul style="list-style-type: none"> - The structure of the atom - Mass number, atomic number and isotopes - Development of the model of the atom - Atoms and nuclear radiation - Alpha, beta and gamma radiation - Half life

Key Stage Four Science Curriculum Overview: Year 10

		Autumn	Spring	Summer
YEAR 10 <i>AQA Trilogy</i>	BIOLOGY	Animal and plant cells, and bioenergetics <ul style="list-style-type: none"> - The processes of photosynthesis and respiration Heart and circulation; nerves and reflex actions <ul style="list-style-type: none"> - Describing the structure of the heart and circulatory system, and how the circulatory system work - Describing how the nervous system works to control the human body 	Hormones and reproduction <ul style="list-style-type: none"> - Describing how hormones control the human body; and their role in reproduction Infection and response <ul style="list-style-type: none"> - Describing the transmission symptoms and treatment of a range of infections - Describing and explaining how the human body is protected from infection - Explaining how transmission of infection can be prevented 	Ecology <ul style="list-style-type: none"> - Exploring how humans are threatening biodiversity as well as the natural systems that support it. - Considering and describing and explaining some actions that need to be taken to ensure our future health, prosperity and well-being and the health of the world's environment
	CHEMISTRY	Chemistry fundamentals and quantitative chemistry <ul style="list-style-type: none"> - Using quantitative analysis to determine the formulae of compounds and the equations for reactions and use quantitative methods to determine the purity of chemical samples and to monitor the yield from chemical reactions The periodic table and the reactions of metals <ul style="list-style-type: none"> - Describing the development of the periodic table and describing and explaining the patterns that can be seen 	Bonding and electrolysis <ul style="list-style-type: none"> - Describing and explaining ionic and covalent bonding - Describing and explaining the process of electrolysis Energy changes: endothermic and exothermic reactions <ul style="list-style-type: none"> - Investigating, describing and explaining the heating and cooling effects of a chemical reaction 	Rates of reaction <ul style="list-style-type: none"> - Describing and explaining the factors that affect the rate of a chemical reaction and explaining the effects that are seen - Explaining the applications of the science in industry
	PHYSICS	Particle model of matter <ul style="list-style-type: none"> - Using the particle model to predict the behaviour of solids, liquids and gases Atomic structure and radiation <ul style="list-style-type: none"> - The uses and hazards of radiation and radioactive substances - Describing and explaining half-life 	Electricity <ul style="list-style-type: none"> - Revisiting circuits - Series and parallel circuits explaining the different characteristics seen - Explaining how electricity is supplied to homes – domestic electricity Forces <ul style="list-style-type: none"> - Explaining forces and their effects, describing and explaining how forces are seen and used in everyday life 	Forces (continued) <ul style="list-style-type: none"> - Explaining forces and their effects, describing and explaining how forces are seen and used in everyday life Magnetism and electromagnetism <ul style="list-style-type: none"> - Describing and explaining how magnets act, and their uses in everyday life - Explaining the magnetic effects of an electric current and the uses of electromagnets

Key Stage Four Science Curriculum Overview: Year 11 Combined Science

		Autumn	Spring	Summer
YEAR 11 COMBINED SCIENCE <i>AQA Trilogy</i>	BIOLOGY	Inheritance <ul style="list-style-type: none"> - Explain the process of fertilisation and how the genes give rise to the features of individuals - Explaining the symptoms prognosis and treatments of some inherited health conditions - Describing and explaining the process of evolution. - Describing and explaining the process of selective breeding, and genetic engineering. 	Cell biology revisit Organisation revisit Infection and response revisit Bioenergetics revisit	<i>Targeted revision</i>
	CHEMISTRY	Organic chemistry <ul style="list-style-type: none"> - The chemistry and patterns of carbon chemistry, alkanes - Fractional distillation and the uses of the products of oil Chemistry of the atmosphere <ul style="list-style-type: none"> - Describing and explaining the development of the atmosphere over time Using resources <ul style="list-style-type: none"> - Describing and explaining the uses of the Earth's finite resources 	Energy changes revisit Chemistry of the atmosphere revisit Bonding structure and properties of matter revisit Quantitative chemistry revisit Chemical changes revisit	<i>Targeted revision</i>
	PHYSICS	Waves <ul style="list-style-type: none"> - Describing the characteristics of longitudinal and transverse waves - Naming the waves in the electromagnetic spectrum and explaining the uses and hazards of each of the waves Forces revisit Energy revisit Particle model of matter <ul style="list-style-type: none"> - Changing state - Specific heat capacity - Latent heat - Energy transfers - Energy resources - Generating electricity 	Energy revisit Electricity revisit Particle model of matter revisit Atomic structure revisit	<i>Targeted revision</i>

Key Stage Four Science Curriculum Overview: Year 11 Separate Sciences

		Autumn	Spring	Summer
YEAR 11 SEPARATE SCIENCES AQA	BIOLOGY	Ecology <ul style="list-style-type: none"> - Exploring how humans are threatening biodiversity as well as the natural systems that support it - Considering and that need to be taken to ensure our future health, prosperity and well-being and the health of the world's environment Inheritance and evolution <ul style="list-style-type: none"> - Explain the process of fertilisation and how the genes give rise to the features of individuals - Explaining the symptoms prognosis and treatments of some inherited health conditions - Describing and explaining the process of evolution - Describing and explaining the process of selective breeding, and genetic engineering 	Inheritance and evolution (continued) <ul style="list-style-type: none"> - Explain the process of fertilisation and how the genes give rise to the features of individuals - Explaining the symptoms prognosis and treatments of some inherited health conditions - Describing and explaining the process of evolution - Describing and explaining the process of selective breeding, and genetic engineering 	<i>Targeted revision</i>
	CHEMISTRY	Energy changes revisit Chemistry of the atmosphere <ul style="list-style-type: none"> - Describing and explaining the development of the atmosphere over time Bonding structure and properties of matter revisit Quantitative chemistry revisit Chemical changes revisit Chemical analysis <ul style="list-style-type: none"> - Describing the chemical tests that can be used to identify the components present Organic chemistry <ul style="list-style-type: none"> - The chemistry and patterns of carbon chemistry, of a range of organic compounds including alkanes, alkenes - Fractional distillation and the uses of the products of oil 	Using resources <ul style="list-style-type: none"> - Describing and explaining the uses of the earth's finite resources The rate and extent of chemical reactions <ul style="list-style-type: none"> - Describing and explaining the factors that affect the rate of a chemical reaction and explaining the effects that are seen - Explaining the applications of the science in industry 	<i>Targeted revision</i>
	PHYSICS	Magnets and electromagnets <ul style="list-style-type: none"> - Describing and explaining how magnets act, and their uses in everyday life - Explaining the magnetic effects of an electric current and the uses of electromagnets Waves <ul style="list-style-type: none"> - Describing the characteristics of longitudinal and transverse waves - Naming the waves in the electromagnetic spectrum and explaining the uses and hazards of each of the waves Space <ul style="list-style-type: none"> - Describing the origins and structure of the universe and our solar system - Explaining the life of a star - Describing and explaining the Red Shift phenomena 	Space (continued) <ul style="list-style-type: none"> - Describing the origins and structure of the universe and our solar system. - Explaining the life of a star. - Describing and explaining the Red Shift phenomena. 	<i>Targeted revision</i>

Key Stage Five Chemistry Curriculum Overview

	Autumn	Spring	Summer
YEAR 12 <i>OCR A</i>	Foundations in chemistry Atoms and reactions Compounds, formulae and equations Amount of substance Acids Redox Electron structure Bonding and structure	Periodic table and energy Periodicity Group 2 The halogens Qualitative analysis Enthalpy changes Reaction rates Chemical equilibrium	Core organic chemistry Basic concepts of organic chemistry Alkanes Alkenes Alcohols Haloalkanes Organic synthesis Analytical techniques
YEAR 13 <i>OCR A</i>	Physical chemistry and transition elements How fast? How far? Acids, bases and buffers Lattice enthalpy Enthalpy and entropy Organic chemistry and analysis Aromatic compounds Carbonyl compounds Carboxylic acids and esters Amines Amino acids, amides and chirality	Organic chemistry and analysis Polyesters and polyamides Carbon-carbon bond formation Organic synthesis Chromatography and qualitative analysis Spectroscopy Physical chemistry and transition elements Redox and electrode potentials Transition metals Qualitative analysis	<i>Targeted revision</i>