Science Curriculum Overview

Part of the Truro and Penwith Academy Trust

Year 7	Topic 1	Topic 2	Topic 3	Topic 4
Biology	Topic: Working Scientifically Key Practicals: Range of investigations based upon a variety of areas. Focus: Outcome: Students Duration: 22 in total, 7 lessons initially plus 15 to be spread in blocks of 3 across the year.	Topic: Cells Key Practicals: Microscope observations Focus: Cell structure and function. Outcome: Students will identify parts of cell, be able to differentiate between animal and plant cells, and use a microscope to observe cells. Duration: 7 lessons	Topic: Structure and Function Key Practicals: Measuring lung volume Focus: The organisation of living things. Outcome: Students will identify key organs and organ systems, and describe the roles of each. Duration: 8 lessons	Topic: Reproduction Key Practicals: Investigating germination. Focus: Reproduction in plants and animals. Outcome: Students will know how plants and animals reproduce sexually via the combination of sex cells. Duration: 10 lessons
Chemistry	Topic: Particles Key Practicals: Effect of temperature on diffusion Focus: Particle Theory Outcome: Students can use particle theory to explain the properties of matter and changes of state. Duration: 9 lessons	Topic: Atoms, Elements and Compounds Key Practicals: N/A Focus: Grouping substances. Outcome: Students can describe elements, mixtures and compounds and understand chemical symbols and formulae Duration: 6 lessons	Topic: Chemical Reactions Key Practicals: Combustion of Fuels Focus: Recognising changes in chemical reactions. Outcome: Students can describe a variety of chemical reactions and apply the principle of conservation of mass. Duration: 8 lessons	Topic: Acids and Alkalis Key Practicals: Making magnesium salts Focus: The reactions of acids and alkalis Outcome: Students can define acids/alkalis, recognise common examples of reactions between them in everyday life. Duration: 6 lessons
Physics	Topic: Forces Key Practicals: Extension of a spring Focus: Examples of forces and their effects Outcome: Students recognise common forces, can identify contact/non-contact forces and can calculate speeds. Duration: 7 lessons	Topic: Sound Key Practicals: Investigating Vibrations Focus: The creation and nature of sound waves. Outcome: Students can describe sounds in terms of pitch and frequency, and can link this to the frequency and amplitude of the vibrations causing them. Duration: 7 lessons	Topic: Light Key Practicals: Bouncing light, Effect of colour filters Focus: Common phenomena associated with light waves. Outcome: Students describe how we see objects, the law of reflection and can explain how colour is seen, and how colour relates to the frequency of light waves. Duration: 7 lessons	Topic: Space Key Practicals: Impact Craters Focus: Our solar system and the movements within it. Outcome: Students can describe the arrangement of the solar system and can relate the motion of objects to their effects on earth. Duration: 6 lessons

The Curriculum Overview covers the skills focus in each year across all the years in the Key Stage

Science Curriculum Overview

Part of the Truro and Penwith Academy Trust

Year 8		Topic 2	Topic 3	Topic 4
Biology	Topic: Investigation Skills Key Practicals: 5 Investigations across a variety of topics. Focus: The scientific method Outcome: Students can plan, carry out and interpret investigations designed to answer scientific questions. Duration: 15 lessons spread in groups of 3 across the year.	Topic: Health and Lifestyle Key Practicals: N/A Focus: How the body absorbs and processes materials Outcome: Students can describe key parts and processes of the digestive system, and know the effects of drugs, alcohol and poor diet on the body. Duration: 10 lessons	Topic: Ecosystem processes Key Practicals: Observing stomata Focus: Relationships in ecosystems Outcome: Students can describe energy and biomass transfers in feeding relationships, including photosynthesis as the process which captures energy needed for all life processes. Duration: 11 lessons	Topic: Adaptation and inheritance Key Practicals: N/A Focus: How characteristics offer survival advantages and are passed across generations. Outcome: Students recognise adaptations in living organisms and the role of chromosomes as the unit of inheritance. Duration: 9 lessons
Chemistry	Topic: The Periodic table Key Practicals: Displacement reactions in group 7. Focus: The history and arrangement of the periodic table Outcome: Students can name the groups and describe patterns in element properties. Duration: 7 lessons	Topic: Separation techniques Key Practicals: filtration, evaporation, distillation, chromatography Focus: How simple mixtures can be separated. Outcome: Students are familiar with a range of common techniques for separating a range of mixtures. Duration: 8 lessons	Topic: Metals and Acids Key Practicals: Reactions of metals, displacement reactions. Focus: Representing chemical reactions. Outcome: Students can write and interpret simple word and formulae equations to represent reactions, and can identify several reaction types. Duration: 10 lessons	Topic: The Earth Key Practicals: Modelling the rock cycle Focus: Earth processes and cycles. Outcome: Students can describe the carbon, water and rock cycles, linking these movements of materials through the earth's spheres. Duration: 9 lessons
Physics	Topic: Electricity and magnetism Key Practicals: Series and Parallel Circuits Focus: Electrical circuits and the nature of magnetism. Outcome: Students can predict the flow of current in series and parallel circuits and describe magnets in terms of field theory. Duration: 10 lessons	Topic: Energy Key Practicals: Identifying common energy transfers Focus: Common stores and transfers of energy Outcome: Students recognise the role energy transfers play in our everyday lives, and can identify these. They apply the ideas to simple machines. Duration: 10 lessons	Topic: Motion and pressure Key Practicals: Measuring pressure Focus: How forces affect motion, including Newton's laws Outcome: Students apply the speed equation to more complex situations, draw graphs of motion and identify situations where Newton's laws apply. Duration: 8 lessons	

The Curriculum Overview covers the skills focus in each year across all the years in the Key Stage

Science Curriculum Overview

Part of the Truro and Penwith Academy Trust

Year 9	Topic 1	Topic 2	Topic 3	Topic 4
Biology	Topic: Cell structure and transport Required Practical: Use a light microscope. Factors affecting osmosis Focus: The structure and function of plant and animal cells. Outcome: Students will identify the connection between cell structure, function and explain the transportation of materials. Duration: 12 lessons	Topic: Cell division Required Practical: Focus: The division and differentiation of cells. Outcome: Students will understand the importance and mechanism of cell division. Duration:6 lessons	Topic: Organisation and the digestive system Required Practical: Standard food tests Focus: Levels of organisation and digestion. Outcome: Students to describe the chemistry of the digestive system. Duration:9 lessons	Topic: Organising plants and animals Required Practical: Focus: The adaptations of animals and plants. Outcome: Students will identify and explain adaptations to animals and plants. Duration: 11 lessons
Chemistry	Topic: Atomic structure Required Practical: Focus: The structure of an atom Outcome: Students will identify that atoms are made up of three sub-atomic particles. Duration:10 lessons	Topic: The periodic table Required Practical: Focus: The trends of the periodic table Outcome: Students will understand the history of the periodic table and trends between groups and periods. Duration: 8 lessons	Topic: Structure and bonding Required Practical: Focus: The structure and bonding of ions Outcome: students will understand how atoms bond to each other in elements and in compounds. Duration:14 lessons	Topic: Chemical calculations Required Practical: Focus: The calculation of chemicals Outcome: Students will carry out calculations using reacting masses to predict balanced symbol equations for reactions. Duration: 11 lessons
Physics	Topic: Conservation and dissipation of energy Required Practical: Focus: Energy and stores. Outcome: Students will understand flows in systems and how to calculate energy changes. Duration:11 lessons	Topic: Energy transfer by heating Required Practical: thermal insulators Focus: Energy transfer. Outcome: Students will understand how energy is transferred during heating processes. Duration:7 lessons	Topic: Energy resources Required Practical: Focus: Energy production. Outcome: Students will identify where energy comes from and the issues surrounding energy production. Duration:7 lessons	Topic: Molecules and matter Required Practical: Focus: States of matter and how states change. Outcome: Students will understand internal energy and the factors that affect changes in state. Duration: 9 lessons

The Curriculum Overview covers the skills focus in each year across all the years in the Key Stage

Science Curriculum Overview

Part of the Truro and Penwith Academy Trust

Year 10	Topic 1	Topic 2	Topic 3	Topic 4
Biology	Topic: Communicable diseases Required Practical: Focus: The origin and spreading of diseases. Outcome: Students will understand the impact of obesity on human health. Duration:13 Lessons	Topic: Preventing and treating disease Required Practical: Focus: Treatment and prevention of diseases. Outcome: Students will understand the role of bacteria and other pathogens in human and plant diseases, and how to calculate the effect of antibacterial chemicals by measuring the area of zones of inhibition. Duration:8 Lessons	Topic: Non-communicable diseases Required Practical: Focus: lifestyle choices on health. Outcome: Students will understand the effect of lifestyle factors including diet, alcohol and smoking on the incidence of non—communicable diseases at local, national and global levels. Duration:7 Lessons	Topic: Photosynthesis Required Practical: Light intensity and rate of photosynthesis Focus: Photosynthesis. Outcome: Students will understand how to measure and calculate the rate of photosynthesis and how different factors affect the rate of photosynthesis. Duration:6 Lessons
Chemistry	Topic: Chemical changes Required Practical: Making a copper salt. Making a salt from a metal carbonate. Focus: How chemicals can change. Outcome: Students will understand how to represent neutralisation using an ionic equation. Duration:10 Lessons	Topic: Electrolysis Required Practical: Electrolysis of solution Focus: Electrolysis of substances. Outcome: Students will describe how electrolysis works and what types of substances can be electrolysed. Duration:6 Lessons	Topic: Energy changes Required Practical: Temperature changes Focus: Transfer of energy. Outcome: Students will understand that energy can be transferred to or from its surroundings in chemical reactions, and some examples of these are endothermic or exothermic reactions. Duration:8 Lessons	Topic: Rates and equilibrium Required Practical: concentration and rate Focus: Rates and equilibrium of chemical reactions. Outcome: Students will understand how to apply the particle model in the collision theory used to explain the effect of changing conditions on the rate of a reaction. Duration: 11 Lessons
Physics	Topic: Electrical circuits Required Practical: Electrical Resistance and components. Focus: Circuits Outcome: Students will understand how to calculate charge flow in an electric circuit. Duration:8 Lessons	Topic: Electricity in the home Required Practical: Focus: Appliances Outcome: Students will understand how to calculate the power of an electrical appliance. Duration:7 Lessons	Topic: Radioactivity Required Practical: Focus: Types of radiation Outcome: Students will understand how an unstable nucleus changes when it becomes stable and why the radiation it gives out is harmful. Duration::11 Lessons	Topic: Forces in balance Required Practical: Focus: Vectors and scalars Outcome: Students will understand the difference between a vector and a scalar and how to represent a vector. Duration:11 Lessons

The Curriculum Overview covers the skills focus in each year across all the years in the Key Stage

Science Curriculum Overview

Year 10	Topic 5	Topic 6	Topic 7	Topic 8
Biology	Topic: Respiration Required Practical: Focus: Aerobic and anaerobic respiration. Outcome: Students will understand how oxygen debt builds up during anaerobic respiration in your muscles. Duration:6 Lessons	Topic: The human nervous system Required Practical: Human reaction time Focus: The nervous system. Outcome: Students will understand the differences between sensory and motor neurones and their roles in coordination and control. Duration:8 Lessons	Topic: Hormonal co-ordination Required Practical: Focus: Hormones. Outcome: Students will understand how hormones control processes such as reproduction and the menstrual cycle. Duration:12 Lessons	Topic: Homeostasis in action (Separate Science only) Required Practical: Focus: Homeostasis. Outcome: Students will understand how the body maintains a constant temperature through homeostasis. Duration: 7 Lessons
Chemistry	Topic: Crude oil and fuels Required Practical: Focus: Burning hydrocarbons. Outcome: Students will understand how fractional distillation is used to separate different fractions from the mixture of hydrocarbons in crude oil. Duration:6 Lessons	Topic: Organic reactions (Separate Science Only) Required Practical: Focus: Organic reactions. Outcome: Students will understand how to draw the displayed formula of alkanes, alkenes, alcohols, carboxylic acids and esters. Duration:6 Lessons	Topic: Polymers (Separate Science Only) Required Practical: Focus: Polymers Outcome: Students will understand the different types of bonding between monomers and how this affects the properties of the polymer. Duration: 6 Lessons	
Physics	Topic: Motion Required Practical: Focus: Motion Outcome: Students will understand the difference between speed and velocity and what we mean by acceleration. Duration:6 Lessons	Topic: Force and motion Required Practical: force and spring, + force and acceleration Focus: Force and motion Outcome: Students will understand how to measure the stiffness of a spring and what is meant by elasticity. Duration:10 Lessons	Topic: Force and pressure (Separate Science Only) Required Practical: Focus: Pressure Outcome: Students will understand how to use the pressure equation and how liquid and atmospheric pressure can change. Duration:6 Lessons	Topic: Space (Separate Science Only) Required Practical: Focus: Space Outcome: Students will understand how satellites stay in their orbits and what we mean by a geostationary satellite. Duration: 7 Lessons

The Curriculum Overview covers the skills focus in each year across all the years in the Key Stage

Science Curriculum Overview

Part of the Truro and Penwith Academy Trust

Year 11	Topic 1	Topic 2	Topic 3	Topic 4
Biology	Topic: Reproduction Required Practical: Focus: Reproduction. Outcome: Students will understand DNA makes up chromosomes, about the variants of genes known as alleles and how all DNA of an organism can be analysed. Duration: 10 lessons	Topic: Variation and evolution Required Practical: Focus: Variation. Outcome: Students will understand the importance of selective breeding in the development of plants and animals and the increasing use of genetic engineering to introduce desirable characteristics. Duration: 7 lessons	Topic: Genetics and evolution Required Practical: Focus:Evolution. Outcome: Students will understand how Charles Darwin built up the evidence for his theory of evolution by natural selection and some of the barriers to acceptance of his ideas, as well as some modern evidence for evolution. Duration:: 10 lessons	Topic: Adaptations, interdependence and competition Required Practical: Measure the population size of a common species in a habitat. Focus: Natural selection. Outcome: Students will understand that competition between organisms for scarce resources will enable them to compete successfully in terms of adaptations from natural selection. Duration: 8 lessons
Chemistry	Topic: Chemical analysis Required Practical: Calculate R_f values, Use chemical tests to identify unknown compounds Focus: Chemical analysis Outcome: Students will understand a wider range of chemical tests to identify unknown gases. Duration: 6 lessons	Topic: The Earth's atmosphere Required Practical: Focus: The atmosphere of the Earth Outcome: Students will understand how the atmosphere developed over the Earth's history before arriving at its current composition. Duration: 5 lessons	Topic: The Earth's resources Required Practical: Purify and test water Focus: The resources of Earth. Outcome: Students will understand how to analyse data on our diminishing finite resources, including order of magnitude estimations, and carry out Life Cycle Assessments to judge the impact of making new materials. Duration: 6 lessons	Topic: Using our resources (Separate Science Only) Required Practical: Focus: Using the Earth's resources. Outcome: Students will understand the use of biological methods to extract some metals, such as copper from low grade deposits of metal ores. Duration: 8 lessons
Physics	Topic: Wave properties Required Practical: Investigating plane waves in a ripple tank and waves in a solid Focus: properties of waves. Outcome: Students will understand how the wavelength of a wave depends on its speed and its frequency. Duration: 7 lessons	Topic: Electromagnetic waves Required Practical: Focus: EM waves Outcome: Students will understand how electromagnetic waves carry information and how they are used to form images. Duration: 5 lessons	Topic: Light (Separate Science Only) Required Practical: Investigate the reflection and refraction of light Focus: Light Outcome: Students will understand how light can be reflected and refracted. Duration:: 5 lessons	Topic: Electromagnetism Required Practical: Focus: Electromagnets. Outcome: Students will understand how a magnetic field is produced in and around a solenoid when a current is passed through a wire. Duration: 8 lessons

The Curriculum Overview covers the skills focus in each year across all the years in the Key Stage

Science Curriculum Overview

Year 11	Topic 5	Topic 6
Biology	Topic: Organising an ecosystem Required Practical: Focus: Levels of organisation. Outcome: Students will understand the levels of organisation within an ecosystem including the cyclical relationships between predators and prey. Duration: 4 lessons	Topic: Biodiversity and ecosystems Required Practical: Focus: Biodiversity Outcome: Students will understand some of the ways people interact with their environment and how these ways can have negative or positive effects on biodiversity. Duration: 12 lessons
Chemistry		
Physics		

The Curriculum Overview covers the skills focus in each year across all the years in the Key Stage