

Edexcel GCSE Combined Science

Course content and curriculum intent

Edexcel GCSE Combined Science develops a coherent understanding of Biology, Chemistry and Physics. Students learn how scientific models explain the natural world, how evidence is produced and evaluated, and how quantitative reasoning supports reliable conclusions.

The curriculum is sequenced from foundational ideas - cells, particles, forces, energy, measurement and experimental method - towards increasingly connected explanations. Students revisit shared concepts such as scale, energy transfer, rates, systems and cause and effect across all three sciences.

Practical work is integral to the course. Students complete all 18 mandatory core practicals and use these experiences to plan investigations, handle apparatus safely, process data, evaluate uncertainty and improve methods. Practical understanding is assessed through the written examinations.

Mathematics, reading and scientific communication are developed throughout. Students calculate with units and equations, interpret graphs and tables, use scientific vocabulary precisely, and construct evidence-based explanations in familiar and unfamiliar contexts.

At KS4 we follow the Pearson Edexcel GCSE (9-1) Combined Science specification. Foundation and Higher Tier content is taught alongside the common core before students are entered for the tier that best reflects their attainment and progression needs.

How the topic-level curriculum is taught

- Recall questions and retrieval tasks connect new learning to earlier topics.
- Explicit teaching develops the big ideas, vocabulary and models needed for secure understanding.
- Hinge questions and end-of-topic diagnostics identify misconceptions and guide reteaching.
- Core, Foundation and Higher content supports appropriate challenge while maintaining a common curriculum.
- Mathematics, reading and industry contexts connect scientific knowledge to engineering, medicine, energy, sustainability and motorsport.

Two year curriculum sequence

Teaching period	Biology	Chemistry	Physics
Year 10 Term 1	CB1 Key concepts in Biology	CC0 Working scientifically; CC1/2 states, mixtures and separation; CC3 atomic structure	CP1 motion; CP2 forces and motion
Year 10 Term 2	CB2 cells and control; CB3 genetics	CC4 periodic table and electronic configuration; CC5 ionic bonding; CC6 covalent bonding	CP3 conservation of energy; CP4 waves
Year 10 Term 3	CB4 natural selection and genetic modification; CB5 health, disease and medicines	CC7 types of substance; CC8 acids and alkalis	CP5 light and the electromagnetic spectrum; CP6 radioactivity
Year 11 Term 1	CB6 plant structures and functions; CB7 coordination, control and homeostasis	CC9 mass calculations; CC10 electrolysis; CC11 obtaining and using metals	CP7 energy and work; CP8 forces and effects; CP9 electricity and circuits
Year 11 Term 2	CB8 exchange and transport; CB9 ecosystems and material cycles	CC12 reversible reactions and equilibria; CC13 periodic groups; CC14 rates	CP10 magnetism and motor effect; CP11 induction; CP12 particle model
Year 11 Term 3	Synoptic review, practical recall and examination preparation	CC15 energy changes; CC16 fuels; CC17 Earth and atmospheric science; review	CP13 forces and matter; synoptic review and examination preparation

Sequencing principles

The sequence keeps each subject's conceptual order intact. Key concepts in Biology are revisited on both Biology papers; Chemistry builds from particles and atomic structure to reactions, rates and Earth science; Physics moves from motion and energy to fields, circuits, matter and materials. Diagnostic review is embedded within every topic rather than left solely to the end of the course.

Biology curriculum

Edexcel Combined Science Papers 1 and 2

Biology topic pathway

Code	Topic	Key curriculum content	Core practical
CB1	Key concepts in Biology	Cells and scale; microscopy; specialised cells; bacteria; enzymes; membrane transport.	1.6, 1.10, 1.16
CB2	Cells and control	Mitosis and growth; stem cells; neurones, synapses and reflex arcs.	-
CB3	Genetics	Meiosis; DNA, genes and chromosomes; inheritance; mutation and variation.	-
CB4	Natural selection and genetic modification	Evolution evidence; natural selection; classification; selective breeding and genetic engineering.	-
CB5	Health, disease and medicines	Disease; pathogens; body defences; immunity; antibiotics and medicine development.	-
CB6	Plant structures and functions	Photosynthesis; limiting factors; water uptake; xylem, transpiration and translocation.	6.5
CB7	Coordination, control and homeostasis	Endocrine control; fertility; blood glucose; diabetes and negative feedback.	-
CB8	Exchange and transport in animals	Exchange surfaces; lungs; circulation; heart function and respiration.	8.11
CB9	Ecosystems and material cycles	Interdependence; environmental factors; fieldwork; biodiversity and material cycles.	9.5

Biology progression

Students move from sub-cellular processes to organisms, populations and ecosystems. Throughout the pathway they connect structure to function, use models across different scales, calculate rates and percentage change, and evaluate biological evidence and its ethical implications.

Chemistry curriculum

Edexcel Papers 3 and 4

Chemistry topic pathway part 1

Code	Topic	Key curriculum content
CC0	Working scientifically	Chemical and physical change; observations and measurement; variables, risk and safe practical routines.
CC1/2	States, mixtures and separation	Particle model; pure substances and mixtures; filtration, crystallisation, distillation and chromatography.
CC3	Atomic structure	Development of atomic models; subatomic particles; atomic and mass number; isotopes and relative atomic mass.
CC4	Periodic table and electronic configuration	Development of the periodic table; groups and periods; metals and non-metals; electron arrangements.
CC5	Ionic bonding	Ion formation; electron transfer; compound names and formulae; ionic lattices and their properties.
CC6	Covalent bonding and simple molecules	Electron sharing; molecular formulae; single and double bonds; dot-and-cross representations.
CC7	Types of substance	Ionic, molecular, giant covalent, polymer and metallic structures linked to physical properties.
CC8	Acids and alkalis	pH, ions and neutralisation; reactions of acids; salts; strong and weak, concentrated and dilute.
CC9	Calculations involving masses	Formula mass; percentage composition; empirical formulae; conservation; reacting masses, concentration and moles.

Chemistry curriculum

Topic pathway continued

Chemistry topic pathway part 2

Code	Topic	Key curriculum content
CC10	Electrolytic processes	Electrolytes and electrodes; ion movement; molten and aqueous electrolysis; redox and half equations.
CC11	Obtaining and using metals	Reactivity series; displacement and redox; extraction; recycling and life-cycle assessment.
CC12	Reversible reactions and equilibria	Reversible change; dynamic equilibrium; the Haber process and condition compromises.
CC13	Groups in the periodic table	Group 1, Group 7 and Group 0 patterns; reactivity trends, displacement and uses.
CC14	Rates of reaction	Rate measurement; collision theory; concentration, pressure, surface area, temperature and catalysts.
CC15	Heat energy changes	Exothermic and endothermic reactions; temperature measurement; reaction profiles and bond energies.
CC16	Fuels	Crude oil, fractional distillation, alkanes, combustion, pollutants, cracking and fuel evaluation.
CC17	Earth and atmospheric science	Atmospheric evolution; greenhouse effect; climate evidence, consequences and carbon footprints.

Chemistry progression

Students first develop particle, atomic and bonding models, then use them to explain properties and chemical change. Quantitative chemistry, electrolysis, metals and equilibria establish the tools needed to analyse rates, energy, fuels and the atmosphere. Practical evidence and symbolic representation are revisited throughout.

Physics curriculum

Edexcel Combined Science Papers 5 and 6

Physics topic pathway part 1

Code	Topic	Key curriculum content
CP1	Motion	SI units; scalars and vectors; speed, acceleration, distance-time and velocity-time graphs.
CP2	Forces and motion	Resultant forces; Newton's laws; mass and weight; momentum; stopping distance and vehicle safety.
CP3	Conservation of energy	Energy stores and pathways; conservation; efficiency; dissipation and energy resources.
CP4	Waves	Wave types and quantities; wave equation; speed measurement; refraction and material interactions.
CP5	Light and the electromagnetic spectrum	Common EM properties; refraction; spectrum order; uses, hazards and exposure.
CP6	Radioactivity	Atomic models; isotopes; decay and nuclear equations; half-life; irradiation and contamination.
CP7	Energy and forces doing work	Work done; mechanical energy transfer; power; efficiency and dissipation.

Physics curriculum

Topic pathway continued

Physics topic pathway part 2

Code	Topic	Key curriculum content
CP8	Forces and their effects	Contact and non-contact forces; fields; free-body diagrams; equilibrium and friction.
CP9	Electricity and circuits	Current, potential difference, charge and resistance; circuit characteristics; power, energy and mains safety.
CP10	Magnetism and motor effect	Magnetic fields; electromagnets; interacting fields; Fleming's left-hand rule and force on a conductor.
CP11	Electromagnetic induction	Induced potential difference; transformers; the National Grid and power calculations.
CP12	Particle model	Density; states and internal energy; specific heat capacity; latent heat; gas pressure and Kelvin scale.
CP13	Forces and matter	Elastic and inelastic deformation; Hooke's law; spring constant; force-extension graphs and work done.

Physics progression

Students use mathematical models to move between descriptions, diagrams, graphs and equations. Motion and conservation establish the foundations for waves and radioactivity; later topics extend force, energy and field models into circuits, magnetism, matter and materials. Engineering contexts support transfer to unfamiliar problems.

Mandatory core practicals

All 18 practicals are completed and recorded during the course

Biology and Chemistry

Reference	Practical focus
Biology 1.6	Use microscopes to investigate specimens, calculate magnification and produce labelled scientific drawings.
Biology 1.10	Investigate the effect of pH on enzyme activity.
Biology 1.16	Investigate osmosis in potatoes and calculate percentage change in mass.
Biology 6.5	Investigate the effect of light intensity on the rate of photosynthesis.
Biology 8.11	Investigate the rate of respiration in living organisms.
Biology 9.5	Use quadrats and belt transects to investigate organisms and their environment.
Chemistry 2.11	Investigate ink composition using simple distillation and paper chromatography.
Chemistry 3.6	Investigate pH change when calcium hydroxide or calcium oxide is added to dilute hydrochloric acid.
Chemistry 3.17	Prepare pure, dry hydrated copper sulfate crystals from copper oxide using a water bath.
Chemistry 3.31	Investigate electrolysis of copper sulfate with inert electrodes and copper electrodes.
Chemistry 7.1	Investigate reaction rates through gas production and the disappearing-cross colour-change method.

Mandatory core practicals

Physics and working scientifically

Physics

Reference	Practical focus
Physics 2.19	Investigate the relationship between force, mass and acceleration using trolleys.
Physics 4.17	Measure and evaluate wave speed, frequency and wavelength in a solid and a fluid.
Physics 5.9	Investigate refraction in rectangular glass blocks.
Physics 10.17	Construct circuits to investigate current, potential difference and resistance, and compare series and parallel circuits.
Physics 14.3	Investigate the densities of solids and liquids.
Physics 14.11	Determine the specific heat capacity of water and obtain a temperature-time graph for melting ice.
Physics 15.6	Investigate extension and work done when forces are applied to a spring.

Working scientifically

- Develop hypotheses and select valid methods, variables, apparatus and controls.
- Measure accurately, record observations clearly and work safely using appropriate risk controls.
- Present and analyse data using tables, graphs, calculations and appropriate significant figures.
- Evaluate accuracy, precision, repeatability, reproducibility, uncertainty and sources of error.
- Use evidence to draw conclusions, improve procedures and communicate scientific reasoning.

Independent learning and assessment

How students consolidate knowledge and demonstrate progress

Independent learning

Independent learning enables students to consolidate classroom learning, close knowledge gaps and build effective revision habits. Tassomai is used to reinforce key ideas through adaptive practice and immediate feedback during homework. Students also complete retrieval, calculation, vocabulary, graph and exam-question practice across all three sciences.

Topic-level reading and industry contexts help students connect abstract science to real applications including medical diagnostics, biotechnology, materials testing, energy systems, environmental monitoring and automotive engineering.

External assessment

Paper	Discipline	Duration	Marks	Weighting
Paper 1	Biology 1	1 hour 10 minutes	60	16.67%
Paper 2	Biology 2	1 hour 10 minutes	60	16.67%
Paper 3	Chemistry 1	1 hour 10 minutes	60	16.67%
Paper 4	Chemistry 2	1 hour 10 minutes	60	16.67%
Paper 5	Physics 1	1 hour 10 minutes	60	16.67%
Paper 6	Physics 2	1 hour 10 minutes	60	16.67%

All six papers are taken at the same tier. Foundation Tier targets grades 1-5 and Higher Tier targets grades 4-9. Papers include multiple-choice, short-answer, calculation and extended open-response questions. Calculators may be used.

School assessment approach: students complete low-stakes checks and half-termly assessments. Year 10 concludes with an end-of-year mock. Year 11 includes a combined-paper mock in November and a full set of papers in February, followed by targeted reteaching.

Progression

The course prepares students for Level 3 sciences, Engineering and related technical routes. It also develops transferable skills in problem-solving, numerical reasoning, data interpretation, practical enquiry and evidence-based communication.