Science department curriculum intent

Department curriculum intent:

To have a broad and balanced curriculum that provides students with ample opportunity to understand the world around them.

In Years 7, 8 and 9, students study the Activate Science curriculum, which covers all mandatory concepts in the national curriculum and has a strong focus on developing scientific skills. Students begin in Year 7 by looking at big ideas in science, such as particles or cells, which provide a strong foundation for the development of knowledge across scientific disciplines in future years. It also builds on KS2 topics, such as 'Living things', in which students first discuss cell theory, but not in as much detail as at KS3. The national curriculum is covered into year 9 with Activate 2 (Year 8) and Activate 3 into year 9, with ample opportunity for the development of skills in planning, carrying out and analysing practical experiments and their results. Literacy remains a key component, with opportunities in every lesson to read, write and talk about scientific ideas and concepts.

In KS4, students study either combined or separate sciences, which build on the strong foundations gained at KS3, and develop students understanding of science to help them explain the world around them. Combined science provides a strong basis by which to move onto further study in a related area, such as going to college to study equine management or science-based A-levels, whereas separate science is tailored to provide a more challenging curriculum that prepares students more thoroughly for post-16 study in the sciences. Students study topics which cover all statutory aspects. Topics are taught in line with what we believe to be most accessible for students during their cognitive development- for example we teach P3- Electricity, last, as this benefits from prior teaching in Physics in energy and generation of electricity before we look at the more complex concepts found in P3. See curriculum mapping and GCSE intent below for more information. Students are able to access all recommended practicals and through this comprehensive approach examining theory, application of this theory in the modern world, and the working scientifically strands embedded through the key stage, students build both their scientific and cultural capital.

At post-16, students study one or more Science A-levels, each of which have a different specification. In Physics, AQA is taught as this has the option to deliver elective modules which students can choose based on their preference. This provides the students not only with a breadth of understanding across disciplines within physics, but also enables them to develop understanding of new areas not previously seen before at GCSE. Biology uses Salters-Nuffield (Advanced Biology) which is structured as themed topics, each topic area having a story/concept connected to them. This enables students to really identify with the subject matter more closely and understand the application and relevance of developing their knowledge. Chemistry runs the OCR A Specification, which takes concepts first developed at GCSE and delves into them in much greater depth. The initial part of the specification focuses on core ideas in chemistry, which enables students to bring their understanding and skills up to speed very quickly, providing a strong bridge between GCSE and A level chemistry.

Curriculum mapping

Year 7	**Overall curriculum intent for year 7:** Students will be introduced to the fundamental key ideas in science across all three sciences, to build a broad understanding of science at KS3.						
		Half term 1	**Half term 2**	**Half term 3**	**Half term 4**	**Half term 5**	**Half term 6**
	Intent for the topic	**Introduction** to science: use of scientific equipment, safety precautions and presenting data. **Cells**: describe similarities and differences between animal, plant and microbial cells and use microscopes to view different cells. **Move onto particles but this will carry on into HT2**	**Particles:** understand how solids, liquids and gases behave, using ideas from the particle model **Forces:** Understand how different types of forces result in motion and how they can be used	**Structure and function of body systems:** Describe and explain the adaptations found in the human body's organ systems **Elements, atoms and compounds**: understand the differences between elements, compounds and mixtures, in terms of their particles and properties.	**Sound:** understand the process of sound transmission, including pitch, volume and human hearing. **Reproduction**: understand the process of plant and animal reproduction, including puberty and birth in humans.	**Reactions:** Understand a range of chemical reactions in terms of energy, reactants and products **Light:** understand the interaction of light with surfaces and objects, and that white light is a mixture of different colours. **Potentially begin acids and alkali's**	**Acids and Alkalis:** understand how to determine the acidity of a liquid, and the different reactions of acids and alkalis.
	Content mapping	Introduction, Cells and Particles topics	Particles and forces topics	Elements, atoms and compounds & sound topic	Sound and repro topics	Reactions and light topics	Acids and alkalis
	Key skills developed	Safety in Science, use of scientific apparatus (microscopes)	Making measurements and accuracy/reliability in measurement	Safely following written instructions and using scientific equipment- glassware and Bunsen burners	Forming opinions around ethical concepts and discussing these- evaluating different ideas	Forming hypotheses and testing these experimentally- colours/reflection/refraction tasks	Developing ideas around quantitative/ qualitative tests (pH/indicator) and recording results

Year 8	**Overall curriculum intent for year 8:** To build upon content from year 7 and develop, deepen and broaden understanding of scientific principles and ideas						
		Half term 1	**Half term 2**	**Half term 3**	**Half term 4**	**Half term 5**	**Half term 6**
	Intent for the topic	**Space**: To understand the scale, movement and conditions found in space **Health and lifestyle:** Understand the effect of healthy and unhealthy lifestyles on our health	**Periodic table:** understand the development and arrangement of the Periodic Table, highlighting key groups present **Charging up- Electricity and Magnetism:** Understand basic electrical and magnetic concepts	**Ecosystem processes:** To understand how the complex interplay between living and non-living components support life on earth **Separating techniques:** Understand the different methods used to separate substances	**Separating techniques:** Understand the different methods used to separate substances **Energy:** Understand examples of and how energy can be transferred from one form to another	**Adaptation and inheritance:** Understand how organisms are adapted and how this can be passed onto offspring **Metal reactions:** Understand the range of reactions metals undergo	**Metal reactions:** Understand the range of reactions metals undergo **Motion and pressure:** Understand the physical concepts underlying motion and pressure
	Content mapping	Space, health and lifestyle	Periodic table, electricity and magnetism	Ecosystem processes, separating techniques	Energy	Adaptation and inheritance, metal reactions	Motion and pressure
	Key skills developed	Understanding the magnitude of astronomical bodies, use of standard form and mathematical scales. Understanding healthy lifestyle choices and the impact of unhealthy ones	Identifying trends and patterns in chemical and physical property data. Building and testing circuits, understanding concepts in terms of equations (V=IR)	Understanding the effect biotic and abiotic factors can have- evaluating models (food chains/webs) and impact of environmental change Practical skill development- planning and carrying out separation experiments	Understanding models- energy transfer and evaluating these to explain phenomena, maths skills calculating energy transfer, efficiency and power	Understanding evolutionary theories and evidence that supports models. Collecting results data, expressing it visually and evaluating materials for uses	Collecting results data, expressing it visually and evaluating materials for uses, mathematical skills calculating values using equations and rearrangement.

Year 9	**Overall curriculum intent for year 9:** To begin the transition from KS3 and the KS3 national curriculum to preparing students for their move to GCSE content by consolidating the key threshold concepts covered at KS3 through synoptic, theme-based topics.						
		Half term 1	**Half term 2**	**Half term 3**	**Half term 4**	**Half term 5**	**Half term 6**
	Intent for the topic	**Motion and pressure (Act 2)** Understand how substances can be influenced by forces to alter their motion and pressure **New Technology in Biology**- how cutting-edge developments in Bioscience impacts our understanding of the world around us **New Technology in Chemistry-** how cutting-edge developments in Chemical science impacts our understanding of the world around us	**New technology in Physics**- how cutting-edge developments in Physics impacts our understanding of the world around us **Turning Points in Biology-** Understand how big ideas in Biology shape our understanding.	**Turning points in Chemistry-** Understand how big ideas in Chemistry shape our understanding. **Turning Points in Physics** Understand how big ideas in Physics shape our understanding	**Detection in Bio**- How can Biology be used to solve crimes-a synoptic look back at content to support move to GCSE **Detection in Chem**- How can Biology be used to solve crimes-a synoptic look back at content to support move to GCSE	**Detection in Physics**- How can Physics be used to discover new life-a synoptic look back at content to support move to GCSE Students begin the first GCSE topics), **P2 Energy** - understand how energy can be generated, and the advantages and disadvantages of methods of generation, **C1 Air and water** - development of atmosphere, pollutants	**P2 Energy** - understand how energy can be generated, and the advantages and disadvantages of methods of generation, **C1 Air and water** Endothermic and exothermic reactions, clean water **B2 Health and disease may be started -** understand how communicable and non-communicable diseases can affect living things.
	Content mapping	Motion and pressure New tech in Biology, New Tech in Chemistry	New tech in Physics, Turning points Biology	Turning points Chemistry, Turning points Physics	Detection in biology, Detection in chemistry	Detection in physics GCSE Topics P2, C1	GCSE Topics P2, C1, B2
	Key skills developed	Ethical decisions in genetic engineering, planning and carrying out experiments, recording data, reaching conclusions, benefit vs risk (regarding nanoparticles, use of alternative fuels), evaluating arguments	Evaluating risk from EM waves, planning and carrying out experiments, ethical concerns about vaccines, analysing antibiotic resistance data	Evaluating atomic models and understanding theory-based approach when examining fossils	Use of a microscope, understanding limitations of forensic techniques, following practical instructions, evaluating results.	P2- Using equations to calculate and to rearrange equations. Carrying out frequency/probability analysis of genetic conditions using diagrams (punnet square, etc.)	Drawing atomic structure, understand compounds and molecules, understanding energy transfer via diagrams and carrying out efficiency calculations.

Year 10 - Biology	**Overall curriculum intent for year 10:** To both broaden and deepen understanding of key biological principles from students' KS3 starting points.						
		Half term 1	**Half term 2**	**Half term 3**	**Half term 4**	**Half term 5**	**Half term 6**
	Intent for the topic	To understand the role of the immune system, vaccines and the impact of communicable and non-communicable diseases on health.		Understand the role photosynthesis plays in the global interdependence of organisms.		Understand the role respiration plays in the maintenance of life, and cells use the energy provided to grow and develop.	
	Content mapping	**B2** Causes of disease, function of immune system, vaccines, plant defences	**B2** Non-communicable disease, heart and lung disease and treatments	**B3** Photosynthesis products and reactants, measuring rate	**B3** Enzymes, food chains and interdependence	**B4** Types of respiration, equations, measuring rate, fermentation, microscopy	**B4** Cell division: mitosis, meiosis, stem cells
	Key skills developed	Calculating bacterial populations, using base 10 calculations. Understanding the ethical implications around vaccination.	Data analysis and trend identification in health data.	Measuring rate of photosynthesis experimentally, using gas collection and water uptake methods. Planning experiments to collect data.	Calculations involving energy transfer between trophic levels. Using source material to form opinions on species extinction. Field studies to examine species distribution.	Using a microscope to image tissues, planning and carrying out experiments to determine rates of reaction. Graph drawing of rate/ product concentration against time.	Identifying cells in mitosis from micrographs. Understanding the ethical implication of stem cell use.

Year 10 - Chemistry	**Overall curriculum intent for year 10:** To both broaden and deepen understanding of key chemical principles from students' KS3 starting points.						
		Half term 1	**Half term 2**	**Half term 3**	**Half term 4**	**Half term 5**	**Half term 6**
	Intent for the topic	To understand how the Earth's atmosphere has changed historically and in response to human activity, as well as how we can improve the quality of both air and water.		Understand how metallic bonding results in metal properties and the range of ways we can extract metals from their ores.		Understand how bonding and structure of materials relates to their properties, how we can make use of these properties, and when we have used the materials, how their impact on the environment can be lessened.	
	Content mapping	**C1**- development of atmosphere, pollutants	**C1-** Endothermic and exothermic reactions, clean water	**C3-** Metallic bonding, properties, methods of extraction, half equations	**C3-**Crude oil, cracking, fractional distillation, polymerisation	**C4**- properties of materials, testing, covalent bonding- simple and giant	**C4**- Carbon allotropes, nanoparticles,

	Key skills developed	Identify the elements in a chemical formula. Balance chemical equations.	Identify gases through conducting gas tests. Interpret graphs about climate change and be able to answer questions using this data. Interpret reaction profiles. Calculate bond energies.	Be able to safely perform electrolysis. Construct and complete half equations.	Calculate empirical formula.	Test materials and identify their properties and suitability for various uses.	Calculate surface area: volume ratio for nanoparticles.

Year 10 - Physics	**Overall curriculum intent for year 10:** To both broaden and deepen understanding of key physical principles from students' KS3 starting points.						
		Half term 1	**Half term 2**	**Half term 3**	**Half term 4**	**Half term 5**	**Half term 6**
	Intent for the topic	To understand how types of wave result in energy transfer and how this can be quantified		To understand the nature and hazards of radioactive materials, and how we can ensure these are safely handled.		To understand how forces result in motion, and how this motion can be expressed in terms of energy transfer	
	Content mapping	**P1** - electromagnetic waves, types of waves, speed of waves, interaction with materials		**P5**- structure of atom, isotopes, types and nature of radiation	**P5**-Half lives, activity net decline.	**P4** Acceleration, SUVAT, distance-time/velocity-time graph, force diagrams.	**P4** Momentum, vector diagrams, Newtons 2nd law, circular motion, reaction times.	**P4** Momentum, work done, safety in car crashes
	Key skills developed	Energy calculations and being able to rearrange equations to calculate all parts of a 3-part formula. Understanding issues facing the UKs energy supplies and potential solutions.		Understanding how to safely handle radioactive materials and the precautions to be taken.	Half-life graph drawing and interpretation-calculations from the graphs.	Graph drawing-using the correct layout and structure for D/T and V/T graphs. Calculations and rearranging.	Drawing vector diagrams and interpreting these. Collecting reaction time data and expressing this graphically.	Calculating using equations, carrying our practicals to determine g

Year 11 - Biology	**Overall curriculum intent for year 11:** Deepen understanding of GCSE Biology, sufficient to ensure post-16 study and job opportunities are able to be progressed onto.					
		Half term 1	**Half term 2**	**Half term 3**	**Half term 4**	**Half term 5**
	Intent for the topic	To understand the role respiration plays in the maintenance of life, and cells use the energy provided to grow and develop.	To understand the role of the circulatory, nervous and endocrine system in the maintenance of a constant internal environment.		To understand the role natural selection plays in the vast variety of life on Earth, and how this has arisen through natural selection and selective breeding.	Revision
	Content mapping	**Continue B4** Cell division- mitosis, meiosis, stem cells	B5 Structure and function of the circulatory system, hormones and nervous system	B5 Homeostasis, diabetes, menstrual cycle	B6 Variation and causes, selective breeding and natural selection, evidence for evolution DNA evidence for evolution, ecosystems and interdependence	B1-6
	Key skills developed	Identifying cells in mitosis from micrographs. Understanding the ethical implication of stem cell use.	Dissection skills- how to safely dissect an organ to identify structural features. Using a microscope to compare blood vessels	Understanding safe choices when using contraceptives and the relative advantages and disadvantages of different types.	Using evidence to explain the presence of multiple species on earth through natural selection. Source analysis and criticism to understand the controversial nature of evolution and how to quality assure scientific knowledge via peer review. Understanding human impacts on global level ecosystems and how to reduce the impact of this.	-

Year 11 - Chemistry	**Overall curriculum intent for year 11:** Deepen understanding of GCSE Chemistry, sufficient to ensure post-16 study and job opportunities are able to be progressed onto.				
	Half term 1	**Half term 2**	**Half term 3**	**Half term 4**	**Half term 5**
Intent for the topic	Understand how chemicals are separated, purified and quantified in solids, liquids and gases		Understand the reactions of acids, and how reactions can be manipulated in terms of rate to optimise yield		Revision
Content mapping	**C5** Separation and purification methods, conservation of mass, the mole	**C5** Acids, Avogadro constant, mole calculations (solids, liquids, gases & solutions), stoichiometry	**C6** Acid reactions, neutralisation, strong and weak acids, factors affecting rate of reaction, catalysts	**C6** Determining and expressing rate graphically, enzymes, reversible reactions & equilibrium	C1-6
Key skills developed	Practical skills to separate mixtures and then purify. Using chromatography, filtration, distillation, evaporation and recrystallisation. Calculating moles and extracting relevant mathematical information from texts and questions.	Conduct titrations and record relevant data. Know the equations for calculating moles and molarity. Balancing chemical equations and processing chemical reaction data.	Titrations – focus on safe use of equipment and accurate reading of volumes on a burette. Collecting data from rate of reaction practicals. Use different techniques to collect data from rate of reaction practicals. Calculate rate of reaction.	Draw graphs of rate of reaction data. Draw tangents on graphs. Describe trends on graphs. Identify outliers. Draw lines of best fit.	Skills of revision: Exam question completion, marking and evaluating. Mind maps.

Year 11 - Physics	**Overall curriculum intent for year 11:** Deepen understanding of GCSE Physics, sufficient to ensure post-16 study and job opportunities are able to be progressed onto.				
	Half term 1	**Half term 2**	**Half term 3**	**Half term 4**	**Half term 5**
Intent for the topic	Understand how electrical circuits behave, and how we can quantify energy, current, voltage and resistance in a variety of circuit arrangements. Understand how magnetic fields work and induce electric fields.		Understand how energy transforms matter and how these changes can be explained using examples such as heating and placing matter under physical stress		Revision
Content mapping	**P3-** Current, Ohm's law, charge, circuit building, V=W/Q,	**P3-** Series, parallel, resistors, thermistors, W=J/S, circuit relationships, transformers	**P6-** density, mass, volume, energy transfers, heat capacity, latent heat	**P6**-Particle model, elastic & plastic deformation, F=kx relationships, Hooke's law.	P1-6
Key skills developed	Calculating various electrical values using key formula and rearranging these. Creating circuits form circuit diagrams.	Carrying out experiments on components (i.e. thermistors) and collecting I/V characteristic data to express graphically.	Calculating volume and using this to determine heat capacity experimentally of different substances.	Carrying out Hooke's law experiments safely and collecting data to determine if materials conform to Hooke's law.	-

Year 12 - Biology	**Overall curriculum intent for year 12:** Develop knowledge on from GCSE content to prepare for the second year of A-level and post-18 study.						
		Half term 1	**Half term 2**	**Half term 3**	**Half term 4**	**Half term 5**	**Half term 6**
	Intent for the topic	Topic 1) Understand the effect of heart disease on the body, thereby understanding the structure and function of the circulatory system and the dependent organs and systems. Topic 2) Understand the structure and function of the cell membrane, and delve deeper into the role of DNA, to include DNA transcription, translation and replication, and how errors in this system can result in diseases such as cystic fibrosis		Topic 3) Understand the ultrastructure of cells, and how this is replicated through cell division (mitosis and meiosis). Understand how DNA is replicated in these processes and how genetic variation can arise. Topic 4) Understand the importance and how to measure biodiversity, and link this to plant cell structure and function, as well as some of the uses of a variety of plants.		Topic 5) Understand how species diversity and succession occurs and carry out sampling to determine species richness. Topic 6) Understand the range of investigative procedures forensic scientists can use to establish time of death, identity (DNA analysis) and cause of death if via infections through understanding the role and function of the immune system.	
	Key skills developed	Data analysis and the difference between correlation and causation, dissection and microscopy skills- building on those at GCSE.	Microscopy and practical planning skills through CPACs- more independent than expected at GCSE.	Risk assessment writing for CPACs, producing microscope slides of allium meristem- using specialist techniques and knowledge.	Carrying out field studies to determine species richness and density.	Field studies and specific calculations to determine statistical significance	Use of specialised equipment (centrifuge) and glassware to make accurate and consistent measurements.

Year 12 - Chemistry	**Overall curriculum intent for year 12:** Develop knowledge on from GCSE content to prepare for the second year of A-level and post-18 study.					
	Half term 1	**Half term 2**	**Half term 3**	**Half term 4**	**Half term 5**	**Half term 6**
	Intent for the topic	Module 2- Foundations in chemistry- students explore a range of core concepts to bridge the gap between GCSE and A-Level, including atomic structure, moles, acids and their reactions, bonding and intermolecular forces.	Module 3- Periodic table and energy: students begin to learn about the periodic table and the nature of periodicity, how these link into energy changes and the ways in which we can determine energy changes. Rate of reaction and equilibria are studied, and a focus on optimising rates of reactions with a view to ensure chemistry is made more sustainable.		Module 4- Core organic chemistry: students begin to understand the various nomenclature conventions for a range of organic substances, and how to express these using a range of different formulae. Understand the reactions, uses and safety precautions to be taken when handling is crucial, as is how to analyse products of reactions instrumentally. Students begin to look at the first set of functional groups within the A-level course: alkanes, alkenes, alcohols and haloalkanes. Students also look at synthesis in organic chemistry and how structures can be identified using spectroscopy.	Module 5- Physical chemistry and transition elements: understand how the impact of changing concentration on rate of reaction can be quantified. Module 6- Understand a greater range of organic chemicals than covered previously, to include aromatic compounds
	Content mapping	Module 2: Atomic structure, quantities of substance, acid reactions, redox, structure and bonding	Module 3: the periodic table, enthalpy changes, rates of reaction, reversible reactions & equilibria and sustainability.		Module 4: nomenclature of functional groups, isomerism, aliphatic hydrocarbons, alcohols and haloalkanes, organic synthesis and instrumental analytical techniques.	Topic 5- 5.1.1 How fast? Topic 6- 6.1.1 Aromatic compounds
	Key skills developed	The CPAC practicals are carried out across the course, as well as the formal teaching of the skills required to complete this successfully.				
		An introduction to the more complex calculations in A-level chemistry, with more focus on multi-step processes. Nomenclature for inorganic chemistry (formulae, equations). Introduction to practical chemistry with more focus on precision and handling of more hazardous chemicals.	Interpreting trends in reactivity and explaining this using the periodic table. The use of drawn enthalpy cycles to visualise complex calculations. Drawing and interpreting rate of reaction graphs. Further development of practical chemistry skills.		Organic chemistry notation for molecules and reaction mechanisms. Nomenclature for different functional groups. The practical techniques and health and safety considerations for organic synthesis practicals.	More sophisticated practical techniques for monitoring rate of reaction. Develop calculation skills further, including the use of logs. Drawing and use of rate of reaction graphs.

Year 12 - Physics	**Overall curriculum intent for year 12:** Develop knowledge on from GCSE content to prepare for the second year of A-level and post-18 study.					
	Half term 1	**Half term 2**	**Half term 3**	**Half term 4**	**Half term 5**	**Half term 6**
	Intent for the topic	Transition to Year 12 Physics- revisiting key skills. Mechanics and materials- Understand scalars and vectors and their treatment, Newtonian laws of motion, as well as how materials behave under stress.		Particles and radiation- understand the fundamental properties of matter, electromagnetic radiation and quantum phenomena. Waves and optics- understand the properties of different wave types and their interactions, including standing waves, superposition and interference.		Electricity- understand the complex interrelationships that exist between current, voltage, power, charge and energy, and how these factors differ in different circuit types.	Further mechanics and thermal physics- Advance further study of motion by examining more complex motional systems Fields: Understand the unifying role field theory can have to gravitational, electrostatic and magnetic fields.
	Content mapping	Mechanics- forces in equilibrium, kinetics, force and momentum	Work, energy and power, materials and tensile strength, thermal energy transfer.	Particles and radiation. Quarks, leptons and quantum phenomena.	Optics- refractions, reflection, interference	DC circuits, electric current, equations, resistance of a wire.	Periodic and circular motion, simple harmonic motion. Fields- Gravitational fields and electric fields, capacitors.
	Key skills developed	Accurate and reliable measurements of time, force, speed, velocity. Understanding the composite nature of complex ideas (i.e. projectile motion). Use of correct units, use of roots and squares. Graphical skills including how to calculate a gradient at a point on a curve.	Recording accurate measurements of wire diameter using micrometers, including zero error check. Safely applying loads to wires until they snap- risk assessment	Development of ability to take accurate measurements of distance (without parallax), ensuring accuracy of results, methods to reduce % error.	Rearranging complex formulas involving roots and squares, use of indices, safe use of lasers and high energy devices with reference to current legislation (CLEAPPS) Wave/particle duality.	Understanding safety processes (heating effect of current). Measuring of current using range of appropriate equipment. Use of logarithmic paper to plot/read results.	Planning and carrying out of investigations into specific heat capacity and latent heat. Planning and carrying experiments to record accurate data on the reciprocal motion of a pendulum/mass spring system and evaluating data to determine accuracy.

Year 12 & 13 – Applied science	**Overall curriculum intent for year 12:** Study a wide variety of scientific ideas across all three science disciplines in greater depth, building a broad base of scientific knowledge at level 3.					
		Half term 1	**Half term 2**	**Half term 3**	**Half term 4**	**Half term 5**	**Half term 6**
	Intent for the topic	Teach Unit 1, All of the chemistry LO1&2 and begin the physics LO5. Complete all of Unit 6, moderate.		Complete Unit 1, Including Biology LO3&4 and Physics LO6. Externally moderate unit 6. Begin teaching Unit 2		Revise Unit 1 and take the Unit 1 Summer exam. Continue teaching unit 2.	
	Content mapping	Unit 1: LO1, 2 Unit 6 Assignments 1, start 2	Unit 1: Complete LO2 and LO5 Unit 6: Assignments 2 and 3	Unit 1: LO3,4, 6	Unit 2: LO 1, 2 &3	Unit 2: LO 4, 5, 6	
	Key skills developed	Calculating relative atomic mass. Describing graphs showing the ionisation energies of elements on the periodic table. Identify biological hazards and the microorganisms that cause them.	Explaining how chemicals interact with each other in various ways: redox, polymerisation. Describing and explaining rate of reactions. Identifying hazards in the lab. Designing a work area.	Identify cell structures from light and electron microscope images. Identify tissue types from light and electron microscope images.	Identify hazards and risks and then write risk assessments. Calibrate equipment. Chromatography. Electrophoresis. Titrations.	Use a light microscope to view slides prepared for pupils and those they prepare themselves. Accurately draw images from a light microscope. Use experimental results to identify unknown substances. Aseptic technique.	

Year 13 - Biology	**Overall curriculum intent for year 13:** Further develop a deep understanding of A-level Biology, sufficient to support the transition to university study.					
		Half term 1	**Half term 2**	**Half term 3**	**Half term 4**	**Half term 5**
	Intent for the topic	Topic 5- understand the role of photosynthesis as a complex biochemical process, how plants fit into ecosystems as key species and the impact of climate change on these ecosystems. Topic 6- Understand the range of investigative procedures forensic scientists can use to establish time of death, identity (DNA analysis) and cause of death if via infections through understanding the role and function of the immune system.	Topic 7- To understand the role of respiration in enabling life to exist, and the role it has in enabling living processes, such as locomotion. Understand how locomotion occurs from the cellular to the macroscopic level, and the key structures involved.	Topic 8-Understand the structure and function of the nervous system in detecting and responding to stimuli, and how various substances can impact on these responses.	Pre-release article work	Revision
	Key skills developed	Understanding the range of evidence that supports climate change- being able to evaluate this information to see how and where the evidence supports, as well as the limitations of such data. Mathematical modelling of temperature changes.	Using live animals safely and responsibly to determine respiratory rate. Risk assessment and ethical considerations made.	Reaction time testing and the mathematical interpretation of different substances' effect on reaction time. Understanding the role, structure and function of different aspects of the brain and how this understanding was obtained experimentally.	Understanding the role of peer review, referencing and literature review in science.	

Year 13 - Chemistry	**Overall curriculum intent for year 13:** Further develop a deep understanding of A-level Chemistry, sufficient to support the transition to university study.					
		Half term 1	**Half term 2**	**Half term 3**	**Half term 4**	**Half term 5**
	Intent for the topic	**Module 5:** Quantify equilibria using experimental data. **Module 6:** Understand the bonding and reactivity in aromatic compounds, including benzene and phenol. Develop understanding of carbonyl compounds, with further investigation into carboxylic acids and esters.	**Module 5:** Understand the reactivity and calculation of pH of acids and bases, as well the actions of buffers. Calculate lattice enthalpy and use Born-Haber cycles. **Module 6:** Understand the reactions, uses and properties of nitrogen compounds- amines, amides and polymers.	**Module 5:** Understand and calculate entropy, enthalpy and free energy, using this to predict reaction feasibility. Understand how redox reactions occur, test this experimentally and understand the application of redox reactions in fuel cells. **Module 6:** Understand the various synthetic routes that can be used to synthesise a range of compounds, as well as the practical techniques used to synthesise and purify these molecules.	**Module 5:** develop a deeper understanding of the transition elements in terms of their properties, reactions and uses. **Module 6:** Understand how to carry out a range of chemical analyses (qualitative and quantitative), and those utilising spectroscopic approaches.	Revision- revise key aspects of the course- student led choices with teacher input on areas to cover
	Content mapping	Equilibria, aromatic compounds, phenols, carbonyl compounds.	pH and buffers, lattice enthalpy and enthalpy of solution, nitrogen chemistry (amines, amides, amino acids) and the formation of polymers.	Entropy and how this links to enthalpy through free energy, redox titrations, electrochemical cells, organic synthesis and purifying organic solids.	Transition elements and their reactivity and organic chemistry qualitative analysis and spectroscopy.	Modules 1-6
	Key skills developed	The CPAC practicals are carried out across the course, as well as the formal teaching of the skills required to complete this successfully.				
		Unstructured calculations for equilibria. Continuation of organic notation and nomenclature.	pH calculations, including the use of logs. The use of drawn cycles in enthalpy calculations. Continuation of organic notation and nomenclature.	Application of titration skills to redox titrations. Organic synthesis and the interconversion of different functional groups.	Identifying trends and patterns in reactivity of transition metals. Qualitative analysis and interpreting spectra.	

Year 13 - Physics	**Overall curriculum intent for year 13:** Further develop a deep understanding of A-level Physics, sufficient to support the transition to university study.					
		Half term 1	**Half term 2**	**Half term 3**	**Half term 4**	**Half term 5**
	Intent for the topic	Continue Topic 6 and 7	Begin topic 8- Nuclear physics-understand the properties and causes of nuclear radiation, and how this phenomenon can have both a positive and negative impact on society.	Begin optional unit- one from astrophysics, medical physics, engineering physics, turning points and electronics	Ensure completion of all topics, begin A-level revision.	Revision of A-level content
	Content mapping	Thermal physics, gases, Boyle's law, simple harmonic motion with spring practical investigation. Capacitors, magnetic fields, electromagnetic induction, force on a wire practical.	Nuclear energy, radiation types, unstable nuclei, decay. Atomic radius, instability, induced fission and safety aspects.	Content depends on the optional unit chosen.	Topics 1-4, student led	Topics 5-9, student led
	Key skills developed	Volume of a cylinder is directly proportional to its length. Periodic motion can be represented by a wave. Fields are related by the inverse square law	Bohr's model of an atom. Relating volume of a sphere to made units. Recall of Yr12 unit on the structure of the atom. Wave/particle duality of light. Qualitative analysis and knowledge of different forms of nuclear radiation. Quantitative analysis of effect of different radioactive emissions on the makeup of an atom.	Content depends on the optional unit chosen.	-	-