Curriculum Plan

Department: Science
Vision Statement The vision for Science at Colton Hills is for all students to "Learn, Do and Use" Science such that all students have developed an understanding of how they, their world, and their universe works. Colton Hills views the Science curriculum as a seven-year journey to gain expertise and experience.
Strapline: From atomic to cosmic
Curriculum Story: Students learn about themselves and their bodies, other organisms, chemical reactions, forces, energy…. Well, everything really! The curriculum revisits key themes such as *Our Place in the Universe* and *Understanding Processes* throughout the seven years.
Skills developed: • To gain substantive knowledge, disciplinary skills, and wider understanding in Science [LEARN]. • To develop those scientific skills over time, demonstrating increased precision and confidence [DO]. • To increasingly apply their knowledge and understanding to new scenarios, in a way that demonstrates expertise, common sense, and both critical and scientific thinking. [USE].

Term	Week	Y7	Y8	Y9	Y9 B	Y9 C	Y9 P	Y10 B (3)	Y10 C (3)	Y10 P (2)	Y11 B (3)	Y11 C (3)	Y11 P (2)
Autumn 1	1	Science Skills & Safety	Science Skills (POAE style)	Electromagnets 2 - Magnetism & Electromagnetism				AQA B3	AQA C4	AQA P3	AQA B7	AQA C9	AQA P6
	2		Genes 1 - Human Reproduction & Variation										
	3	Organisms 1 - Cells & Digestion											
	4												
	5			Organisms 2 - Breathing & Movement									
	6		Reactions 1 - Acids & Alkalis and Metals & Acids										
	7	Matter 1 - Particle Model & Separating											
	8												
HT	HT	HT	HT	HT	HT	HT	HT	HT	HT	HT	HT	HT	HT
Autumn 2	9	Matter 1 - Particle Model & Separating Mixtures	Reactions 1 - Acids & Alkalis and Metals & Acids	Electromagnets 1 - Voltage, Resistance & Current				AQA B2	AQA C4	AQA P4	Revision	Revision	Revision
	10										Mock Exams	Mock Exams	Mock Exams
	11	Forces 2 - Contact Forces & Pressure	Earth 1 - Structure & Universe								Mock Exams	Mock Exams	Mock Exams
	12												
	13								AQA C5		AQA B7	AQA C10	AQA P7
	14		Ecosystems 1 - Interdependence & Plant Reproduction	Reactions 2 - Chemical Energy & Types of Reaction									
	15	SLIP	SLIP	SLIP						AQA P5			
XMAS	XMAS	XMAS	XMAS	XMAS	XMAS	XMAS	XMAS	XMAS	XMAS	XMAS	XMAS	XMAS	XMAS
Spring 1	16	Genes 2 - Inheritance & Evolution	Ecosystems 1 - Interdependence & Plant Reproduction	Reactions 2 - Chemical Energy &				AQA B2	AQA C6	AQA P5	Revision	Revision	Revision
	17			STEM									
	18			SLIP				AQA B5					
	19		Waves 2 - Effects & Properties										
	20	Waves 1 - Sounds & Light		Science Skills (RQP style)									
	21												
HT	HT	HT	HT	HT	HT	HT	HT	HT	HT	HT	HT	HT	HT
Spring 2	22	Waves 1 - Sounds & Light	Waves 2 - Effects & Properties	⇨ Split to specialist model ⇦	AQA B1	AQA C1	AQA P1	AQA B5	AQA C7	AQA P5	Revision	Revision	Revision
	23												
	24	Matter 2 - Periodic Table & Elements	Earth 2 - Climate & Resources					AQA B6			Mock Exams	Mock Exams	Mock Exams
	25												
	26								AQA C8		Revision	Revision	Revision
	27		Energy 2 - Work, Heating & Cooling										
EASTER	EASTER	EASTER	EASTER	EASTER	EASTER	EASTER	EASTER	EASTER	EASTER	EASTER	EASTER	EASTER	EASTER
Summer 1	28	Energy 1 - Costs & Transfers	Energy 2 - Work, Heating & Cooling		AQA B1	AQA C1	AQA P1	AQA B6	AQA C8	AQA P5	Revision / Exams	Revision / Exams	Revision / Exams
	29					AQA C2							
	30				AQA B4		AQA P2						
	31		SLIP										
	32	SLIP	Ecosystems 2 - Respiration & Photosynthesis										
HT	HT	HT	HT	HT	HT	HT	HT	HT	HT	HT	HT	HT	HT
Summer 2	33	Forces 1 - Speed & Gravity	Ecosystems 2 - Respiration & Photosynthesis		AQA B4	AQA C2	AQA P2	Revision	Revision	Revision	Revision / Exams	Revision / Exams	Revision / Exams
	34												
	35							Mock Exams	Mock Exams	Mock Exams			
	36		Science Skills										
	37	STEM	SLIP					Mock Review	Mock Review	Mock Review			
	38	SLIP	STEM			AQA C3							
	39	SLIP	SLIP					Reteach	Reteach	Reteach			
EOY	EOY	EOY	EOY	EOY	EOY	EOY	EOY	EOY	EOY	EOY	EOY	EOY	EOY

Year 7: Fundamentals of Science

Biology Chemistry Physics

Topics	Why we teach this	Links to last topic	Links to future topics	Key skills developed	Cultural capital opportunities	Links to whole school curriculum
Autumn 1						
Science Safety & Skills Cells & Breathing Particle Model	Safety First! Keeping students safe so they can engage with the future practical work is key. Understanding our own bodies Understanding materials	Links to Primary Science	Links to All Future Topics Links to Biology GCSE topics Links to Chemistry & Physics GCSE topics	Scientific Literacy Numeracy Critical Thinking Analysis	Humans as organisms STEM Careers	Sport & PE
Autumn 2						
Separating Mixtures Contact Forces & Pressure	Understanding Materials Understanding Force Interactions	Links to Primary Science	Links to Chemistry GCSE topics Links to Physics GCSE topics	Scientific Literacy Numeracy Critical Thinking Analysis	STEM Careers	Sport & PE Mathematics Food Technology
Spring 1						
Inheritance & Evolution Sounds & Light	Understanding where we came from, as a species Understanding wave phenomena	Links to Primary Science	Links to Biology GCSE topics Links to Physics GCSE topics	Scientific Literacy Numeracy Critical Thinking	Debate: Creation v Science STEM Careers	English RS Performing Arts

				Analysis		
Spring 2						
Sounds & Light Periodic Table & Matter	Understanding wave phenomena Understanding elements and their properties	Links to Primary Science	Links to Physics GCSE topics Links to Chemistry GCSE topics	Scientific Literacy Numeracy Critical Thinking Analysis	STEM Careers	Numeracy
Summer 1						
Energy Costs & Transfers	Understanding how energy is "used" and "charged for"	Links to Primary Science	Links to Physics GCSE topics	Scientific Literacy Numeracy Critical Thinking Analysis	STEM Careers Understanding electricity bills	Mathematics Technology
Summer 2						
Speed & Gravity	Understanding the difference between mass, weight and gravity Ability to measure speed and relative speed	Links to Primary Science	Links to Physics GCSE topics	Scientific Literacy Numeracy Critical Thinking Analysis	Space Exploration STEM Careers	Mathematics PSHE (Road Safety)

Year 8: Knowing Science

Biology Chemistry Physics

Topics	Why we teach this	Links to last topic	Links to future topics	Key skills developed	Cultural capital opportunities	Links to whole school curriculum
		Autumn 1				
Human Reproduction & Variation Acids & Alkalis	To understand how humans procreate To understand why we are different To distinguish between acids and alkalis	Links to cells Links to fundamental chemistry	Links to Biology GCSE topics Links to Chemistry GCSE topics	Scientific Literacy Numeracy Critical Thinking Analysis	Real life acids and alkalis STEM Careers	RSE / PSHE (Variation, Contraception, Equality) Health & Childcare
		Autumn 2				
Metals & Non-Metals Earth Structure & Universe Interdependence	To describe and understand elements on the periodic table To describe the structure of the earth, and celestial objects To understand how living things in an environment are related	Links to atoms, elements & the Periodic table Links to space Links to biodiversity and ecology	Links to Chemistry GCSE topics Links to Chemistry and Physics GCSE topics Links to Biology GCSE topics	Scientific Literacy Numeracy Critical Thinking Analysis	STEM Careers	Technology Geography
		Spring 1				
Plant Reproduction Wave Effects & Properties	How a plant is structured for reproduction How waves behave and interact with their surroundings	Links to human reproduction, plant biology, ecology Links to waves and communication	Links to Biology GCSE topics Links to Physics GCSE topics	Scientific Literacy Numeracy Critical Thinking	The need for *seed banks* STEM Careers	Food technology Music Technology

				Analysis		
Spring 2						
Climate & Earth Resources Work	What is the green house effect? What is global warming? How is energy transferred usefully?	Links to ecology Links to chemical resources Links to energy	Links to Chemistry GCSE topics Links to Physics GCSE topics	Scientific Literacy Numeracy Critical Thinking Analysis	STEM Careers	PSHE (Environmental Responsibility) Technology
Summer 1						
Heating & Cooling Respiration	How is energy transferred and stored usefully as heat? How does energy get “used” in the body?	Links to energy Links to bioenergetics	Links to Physics GCSE topics Links to Biology GCSE topics	Scientific Literacy Numeracy Critical Thinking Analysis	STEM Careers	Technology Health & Child Care
Summer 2						
Photosynthesis	How is sunlight used to produce food?	Links to bioenergetics	Links to Biology GCSE topics	Scientific Literacy Numeracy Critical Thinking Analysis	The need to grow enough food STEM Careers	Food technology PSHE (Sustainable food production)

Year 9: Describing Science

Biology Chemistry Physics

Topics	Why we teach this	Links to last topic	Links to future topics	Key skills developed	Cultural capital opportunities	Links to whole school curriculum
		Autumn 1				
Magnetism & Electromagnetism Movement & Digestion	To understand how devices work To understand how our bodies function	Links to forces Links to cells	Links to Physics GCSE topics Links to Biology GCSE topics	Scientific Literacy Numeracy Critical Thinking Analysis	STEM Careers Healthy Diet	Food technology PSHE (healthy eating)
		Autumn 2				
Voltage, Current and Resistance Chemical Energy	To understand how circuits work To understand how chemical reactions happen	Links to electricity, mains power Links to elements compounds and mixtures	Links to Physics GCSE topics Links to Chemistry GCSE topics	Scientific Literacy Numeracy Critical Thinking Analysis	Importance of electricity in every day life STEM Careers	Technology, Electrical Engineering
		Spring 1				
Types of Chemical Reaction Required Practical Skills	To understand how different chemical reactions happen To develop core skills around practical work needed for GCSE	Links to chemical energy All	Links to Chemistry GCSE topics All	Scientific Literacy Numeracy Critical Thinking Analysis	STEM Careers	

Spring 2						
Cell Biology Atomic Structure Energy	What are cells, their organelles and their functions What is an atom? How is energy stored and transferred usefully?	Links to KS3 Cells Links to KS3 Atoms Links to KS3 Energy	Links to A-Level Biology topics Links to A-Level Chemistry topics Links to A-Level Physics topics Links to BTEC/AAQ topics	Scientific Literacy Numeracy Critical Thinking Analysis	Idea of using models STEM Careers	Technology
Summer 1						
Cell Biology Bioenergetics Atomic Structure Structure & Bonding Energy Electricity	What are cells, their organelles and their functions? What is photosynthesis? What is respiration? What is an atom? How do atoms form compounds? How is energy transferred and stored usefully? How do circuits work	Links to KS3 cells Links to KS3 Photosynthesis Links to KS3 Atoms Links to KS3 Energy Links to KS3 Electricity and Magnetism	Links to A-Level Biology topics Links to A-Level Chemistry topics Links to A-Level Physics topics Links to BTEC/AAQ topics	Scientific Literacy Numeracy Critical Thinking Analysis	Costs of electricity Environmental impact of using energy resources STEM Careers	Technology Electrical Engineering
Summer 2						
Bioenergetics	What is photosynthesis? What is respiration?	Links to KS3 respiration	Links to A-Level Biology topics	Scientific Literacy Numeracy	Mains electricity – costs and dangers	PE/Sport Technology

Quantitative Chemistry Electricity	How do we measure chemicals? How do circuits work?	Links to all KS3 chemistry Links to KS3 Electricity and Magnetism	Links to A-Level Chemistry topics Links to A-Level Physics topics Links to BTEC/AAQ topics	Critical Thinking Analysis	STEM Careers	

Year 10: Explaining Science

Biology Chemistry Physics

Topics	Why we teach this	Links to last topic	Links to future topics	Key skills developed	Cultural capital opportunities	Links to whole school curriculum
	Autumn 1					
Infection & Response Chemical Changes Particle Model of Matter	How do pathogens effect us, and how can we stop them? How do chemical reactions work? How are particles arranged, and what is density?	Links to KS3 and GCSE Cells Links to all KS3 chemistry Links to particle model	Links to A-Level Biology topics Links to A-Level Chemistry topics Links to A-Level Physics topics Links to BTEC/AAQ topics	Scientific Literacy Numeracy Critical Thinking Analysis	Covid and keeping everyone safe STEM Careers	PSHE (Public Health)
	Autumn 2					
Organisation Chemical Changes Energy Changes Radioactivity	How do cells form tissues, organs, organ systems and organisms? How are new products made in chemical reactions? What are exo- and endo-thermic reactions? What are the properties of alpha, beta and gamma radiation?	Links to KS3 and GCSE Cells Links to all Chemistry Links to Particle Model of Matter	Links to A-Level Biology topics Links to A-Level Chemistry topics Links to A-Level Physics topics Links to BTEC/AAQ topics	Scientific Literacy Numeracy Critical Thinking Analysis	Nuclear Power debate STEM Careers	PE/Sport Technology
	Spring 1					

Organisation Homeostasis & Response Rate of Chemical Change Forces	How do cells form tissues, organs, organ systems and organisms? How does our body control itself? How can reactions be sped up? How do we interact with the world around us?	Links to KS3 cells, GCSE cells Links to Organisation Links to all chemistry topics Links to all Physics topics	Links to A-Level Biology topics Links to A-Level Chemistry topics Links to A-Level Physics topics Links to BTEC/AAQ topics	Scientific Literacy Numeracy Critical Thinking Analysis	STEM Careers	PE/Sport Medicine Technology
Spring 2						
Inheritance, Variation & Evolution Organic Chemistry Forces	How are genes expressed? Why is crude oil useful? How does motion happen?	Links to KS3 Genes Links to Earth Resources Links to all Physics topics	Links to A-Level Biology topics Links to A-Level Chemistry topics Links to A-Level Physics topics Links to BTEC/AAQ topics	Scientific Literacy Numeracy Critical Thinking Analysis	STEM Careers Road safety	PSHE/RSE (Reproduction, genetics, characteristics) Technology
Summer 1						
Inheritance, Variation & Evolution Chemical Analysis Forces	How are genes expressed? How are chemicals identified? How does motion happen?	Links to KS3 Genes Links to all chemistry topics Links to all physics topics	Links to A-Level Biology topics Links to A-Level Chemistry topics Links to A-Level Physics topics	Scientific Literacy Numeracy Critical Thinking Analysis	STEM Careers Road safety	PSHE/RSE (Reproduction, genetics, characteristics) Technology

			Links to BTEC/AAQ topics			
Summer 2						
Revision for Mock Examinations Mock Examinations Mock Review and Reteach of Misconceptions	To prepare for Public Examinations	All	All	Scientific Literacy Numeracy Critical Thinking Analysis	STEM Careers	

Year 11: GCSEs

Biology Chemistry Physics

Topics	Why we teach this	Links to last topic	Links to future topics	Key skills developed	Cultural capital opportunities	Links to whole school curriculum
Autumn 1						
Ecology Chemistry of the Atmosphere Waves	To understand the world around us To understand how the atmosphere has changed To understand how we use waves to communicate	Interdependence Elements, Compounds and Mixtures Wave Effects	All	Scientific Literacy Numeracy Critical Thinking Analysis	STEM Careers	PSHE (Environment) History Technology
Autumn 2						
Revision for Mock Examinations Ecology Using Resources Magnets & Electromagnets	To prepare for Public Examinations To understand the world around us To understand how we can use materials from the Earth To understand how devices work	All Interdependence Chemical Resources Magnets	All	Scientific Literacy Numeracy Critical Thinking Analysis	STEM Careers	PSHE (Environment)
Spring 1						

Revision	To prepare for Public Examinations	All	All			
Spring 2						
Revision	To prepare for Public Examinations	All	All	Exam Technique		
Summer 1						
Revision GCSE Examinations	To prepare for Public Examinations	All	All	Exam Technique		

Year 12 BIOLOGY: [The science of life]

[From molecules to ecosystems]

Topics	Why we teach this	Links to last topic	Links to future topics	Key skills developed	Cultural capital opportunities	Links to whole school curriculum
Autumn 1 [What happens in cells and what they are made of]						
Cell structure and division Biological molecules	To understand how to apply knowledge from the microscopic and biochemical molecular level to the anatomical / physiological	Link to KS3 cells and GCSE B1 cells and microscopes Link to digestion KS3 and KS4 organic C7	Links to cell membrane Links to DNA and protein synthesis topic	Statistics, maths, extended response, application, making links, critical evaluation	Careers. Ethics. Lab work; working with animals. Real world applications; forensics, medical	History: development of microscopes Maths: statistics Art: biological drawing
Autumn 2 [How substances move and the bodies army]						
Transport and cell membrane **Cells and immune system**	To emphasise the importance of the structure of the cell membrane in the good functioning of the body To understand the immune system	Links to KS3 osmosis, diffusion, genetics (DNA) Links to KS4 cell transport, active transport, monoclonal antibodies and immune system	Links to study of DNA and RNA Links to gas exchange	Statistics, maths, extended response, application, making links, critical evaluation	Careers. Ethics. Lab work; working with animals. Real world applications; forensics, medical	Art: biological drawing Food technology: diffusion of food colouring PE respiration and its importance for exercise
Spring 1 [How things move through living things]						
DNA replication, inorganic ions **Exchange and transport systems**	To explain how chemical move inside of the body to enable certain chemical reaction in order for the optimum functioning of our body	Links to KS3 osmosis, diffusion, genetics (DNA) Links to KS4 cell transport	Links to diversity, selection and mutation	Statistics, maths, extended response, application, making links, critical evaluation	Careers, ethics. Lab work; working with animals. Real world applications; forensics, medical	History: the work of different scientists over the years Maths: 2 ways tables and statistics

Spring 2 [Which is the most important organ? How did the organisms we know arise?]						
The heart Genetic diversity and adaptation	To explain the anatomy of the heart and how it enables it to perform its job and how defects can affect its normal functioning To explain how DNA can mutate during cell division To understand the diversity of life	Links to ks3 organisation Links to heart and circulatory system and genetic KS4	Draw to diversity and classification	Statistics, maths, extended response, application, making links, critical evaluation	Careers. Ethics. Lab work; working with animals. Real world applications; forensics	Maths : statistics English essay writing
Summer 1 [The diversity of life]						
Diversity and classification Revision of information	To explain and investigate variation and classification. To describe biodiversity and its importance for our planet especially in agriculture	Links to KS3 inheritance Links to KS4 genetics and biodiversity	Links to populations and ecosystems, mutation and gene expression	Statistics, maths, extended response, application, making links, critical evaluation	Careers. Lab work; sampling. Real world applications; fitness industry. Zoo trip.	Maths statistics 2 ways tables English essay writing And writing report
Summer 2 [From electrons in photosynthesis to Carbon in the ecosystem]						
Photosynthesis Energy and ecosystem Nutrient cycles	To explain how photosynthesis occurs on the microscopic level and the biochemistry behind it To explore the impact of energy and cycles on living things	Links to KS3/4 photosynthesis and respiration, water cycle, carbon cycle	Draw to mutation and gene expression Draws to the topic respiration	Statistics, maths, extended response, application, making links, critical evaluation	Careers, lab work; sampling. Real world applications, industry	Art: biological drawing Chemistry: reactions Maths statistics, calculation English essay writing

Year 12 CHEMISTRY: [Real world Chemists in the making] [Supersede GCSE basic Chemistry knowledge, explore it, master the theory and practical skills]						
Topics	**Why we teach this**	**Links to last topic**	**Links to future topics**	**Key skills developed**	**Cultural capital opportunities**	**Links to whole school curriculum**
Autumn 1 [Deduce the atom, bonds and crack the moles]						
1.1 Atomic structure 1.2 Amount of Substance	To understand how properties depend on atom structure and arrangement of electrons. So we can make the relatively small entities workable using moles.	GCSE Chem: C1,C3 Physics: P4	Bonding, Energetics, Periodicity, Acids, bases and pH, organic analysis	Understanding abstract ideas, Maths, lab work	Lab work, spectrometer, production of substances,	Maths-calculations, Physics-atoms, History of atom

Autumn 2 [Cracking physical chemistry and studying bonding]						
1.3 Bonding 1.4 Energetics	So we can understand how atoms/ions are held together to give different structures. So we can determine the energy changes.	GCSE Chemistry: C2, C5+6	Thermodynamics, organic/inorganic chemistry, polymer, isomerism,	abstract ideas, Maths, application, lab work	Lab work, designing boilers, internal combustion engines	Maths: Calculations, Biology: DNA structure, aerobic & anaerobic reactions
Spring 1 [Carry out quicker reactions or slow them down, understand the complexity of carbon compounds, discover isomerism]						
1.5 Kinetics 3.1 Intro Organic Chemistry	So as chemists we can alter the conditions to affect the speed of the reaction. So we understand the vast synthetic materials created by Chemists.	GCSE Chem: C5+6, C7	Rate equations and equilibrium constants, A2 organic chemistry	Understanding abstract ideas, Maths, application	Synthetic material manufacture, drugs, medicine & plastic	Maths: Calculations, Biology: Enzymes, exchange surface, biological molecule
Spring 2 [Let equilibria do its magic, explore in detail the environmental consequences human cause]						
1.6 Equilibria and Redox 3.2 Alkanes and Halogenoalkanes	So we can determine how far a reaction will go. So we understand the use of materials extracted from Earth.	GCSE Chem: C5+6, C7	Rate equations and equilibrium constants, A2 organic chemistry	Understanding abstract ideas, Maths, application, lab work	Chemical industry, environmentalists, Pharmaceuticals	Biology: photosynthesis & respiration Maths- Calculations Geography- Ozone
Summer 1 [The uniqueness of the element position in periodic table, electrophilic reactions, beneficial uses of alcohol & enhance your analytical skills]						
2.1 + 2.2 Periodicity 3.3 Alkenes and alcohols 3.4 Organic Analysis	So we understand how historians have laid out the elements and why. So we can understand how alkenes and alcohols are utilized in everyday life So we can apply organic compounds knowledge into identification of substances.	GCSE Chem C1, C7, C8, C10	A2 organic and inorganic chemistry.	Constructing & deducing abstract concepts, analytical techniques	Lab work, forensics, water purification, product synthesis, sustainability, agriculture	Biology: biological molecules
Summer 2 [The Science of Memory and pathway of progression]						
Revision + Exams	To retrieve, fill the gaps, apply and review. To learn how to retrieve.	All	Feeds into exams	Recall, apply, evaluate, maths	All and any of the above.	Biology Maths, Geography, History

Year 12 PHYSICS: [The fundamentals of physics] [From quarks coming into existence to colliding galaxies]						
Topics	**Why we teach this**	**Links to last topic**	**Links to future topics**	**Key skills developed**	**Cultural capital opportunities**	**Links to whole school curriculum**
Autumn 1 [Fundamentals of dc circuits]						
Electricity	To lay the groundwork for later study of the many electrical applications that are important to society.	GCSE P2 Electricity P4 Atoms	Year 13: fields	Maths skills, recall, understanding & application of knowledge, practical skills	Careers. Lab work. How ideas change	Maths History – atomic structure, electrical current
Autumn 2 [The characteristics and properties of progressive and stationary waves]						
Waves	To develop knowledge of the characteristics, properties, and applications of travelling waves and stationary waves. Topics treated include refraction, diffraction, superposition and interference.	GCSE P6 Waves	Year 13 astrophysics	Maths skills, recall, understanding & application of knowledge, practical skills	Careers. Lab work. How ideas change.	Maths History – Young's double slit experiment, wave particle duality, particle nature of EM waves
Spring 1 [Vectors, scalars and Newton's laws of motion]						
Mechanics and materials	To develop knowledge and understanding of forces, energy and momentum. The section continues with a study of materials considered in terms of their bulk properties and tensile strength.	GCSE P1 Energy P3 Particles P5 Forces	Further mechanics Year 13: fields, astrophysics	Maths skills, recall, understanding & application of knowledge, practical skills	Careers. Lab work.	A level Maths History – Newton's laws of motion, Hooke's Law D&T – forces, materials
Spring 2 [The particle zoo and quantum mechanics]						
Particles and radiation	To develop knowledge and understanding the fundamental properties of matter, electromagnetic radiation and quantum phenomena. To be aware of how ideas develop and evolve and appreciate the importance of international collaboration in the development of new experiments and theories	GCSE P4 Atomic structure P6 Waves	Year 13: nuclear physics, astrophysics	Maths skills, recall, understanding & application of knowledge, practical skills	Careers. Lab work. How ideas change.	Maths History – atomic structure, wave particle duality, particle nature of EM waves Chemistry – atoms, elements, isotopes

Summer 1 [From atomic vibrations to the rotation of galaxy clusters]						
Further mechanics	To further advance earlier study of mechanics through a consideration of circular motion and simple harmonic motion.	GCSE P1 Energy P5 Forces P8 Space Year 12 mechanics	Year13: fields, astrophysics	Maths skills, recall, understanding & application of knowledge, practical skills	Careers. Lab work. How ideas change. Real world applications: planetary and satellite orbits, proton beam therapy, spectroscopy	A level Maths History – gas laws Chemistry- gas laws, moles, Avogadro D&T – forces
Summer 2 [How the molecular model of a gas has developed from the macroscopic properties of gases]						
Thermal physics	To study in depth the thermal properties of materials, the properties and nature of ideal gases, and the molecular kinetic theory.	P3 Particle model of matter	Post 16 study	Maths skills, recall, & application of knowledge, practical skills	Careers. Lab work. How ideas change. Real world applications: planetary and satellite orbits, proton beam therapy, spectroscopy	Maths History – gas laws

Year 12 BTEC:

Develop skills for effective scientific investigation through practical based learning, methodical planning and risk assessment for scientific report writing.

Topics	**Why we teach this**	**Links to last topic**	**Links to future topics**	**Key skills developed**	**Cultural capital opportunities**	**Links to whole school curriculum**
Autumn 1 The role of biological molecules in the functions of the cell and the formation of chemical substances.						
Unit 1 A1 Structure and bonding and A2 Production and uses of substances in relation to properties	To understand the structure of elements molecules and compounds, and how these can be produced through the relevant chemical reactions and their applications.	AQA GCSE C1 C2 C3 C4	Unit 3 D1 BTEC Unit 2 Assignment 2B calorimetry	Practical skills report writing Risk Assessment Critical evaluation	Chemical reactions in industry to produce all modern day substances such as fertiliser, clothes and glass.	Technology
Unit 3 D1 Enzymes in action	To develop the understanding of how proteins are formed and the role they play in creating functioning cells. Thus leading to all biological life.	GCSE AQA B2	BTEC Unit 2 Assignment 2C chromatography	Practical skills report writing Risk Assessment Critical evaluation	Brewing and role of fermentation. Multi billion pound industry worldwide.	Food technology
Autumn 2 How substances move and how substances are joined.						
Unit 1 A1 Structure and bonding and A2 Production and uses of substances in relation to properties	To understand the structure of elements molecules and compounds, and how these can be produced through the relevant	AQA GCSE C1 C2 C3 C4	Unit 3 D1_Enzymes in action	Practical skills report writing Risk Assessment Critical evaluation	Chemical reactions in industry to produce all modern day substances such as fertiliser, clothes and glass.	Technology

	chemical reactions and their applications.		BTEC Unit 2 Assignment 2B calorimetry			
Unit 3 E1 Diffusion of molecules	To understand the role of diffusion and transport of substances through various mediums and applications in chemical engineering and chemical analysis.	GCSE AQA B1 C6	BTEC Unit 2 Assignment 2C chromatography	Practical skills report writing Risk Assessment Critical evaluation	Role of diffusion in the process of chromatography for forensics.	Technology, engineering, Art mediums.
Spring 1 How cells form the structures of organisms, and how they help them to survive in the environment.						
Unit 1 B1 Cell structure and function B2 Cell specialisation	To understand the role of cells in organisms and how they allow the seven life processes to be carried out. The specialisation of cells for an organism to adapt to the abiotic factors of its environment.	GCSE AQA B1	BTEC Unit 8 Assignment 8C Digestive system	Practical skills report writing Risk Assessment Critical evaluation	Understand the role of Biomedical scientists, Doctors and the professionals in the field of medicine.	Physical Education
Unit 3 F1 Plants and their Environment	To understand how plants are adapted to acquire resources from their environment and the impact of plants in ecological terms of biodiversity.	GCSE AQA B4 B7	BTEC Unit 1 B1 Cell structure and function and B2 Cell specialisation	Practical skills report writing Critical evaluation Risk Assessment Sampling Methods	Impact of plants on the biodiversity and sustainability of the planet and its biological resources. Forestry management.	Geography
Spring 2 Cell organisation, the role of waves and energy in bonds.						
Unit 1 B3 Tissue structure and function C1 Working with waves	To understand how the gross structures of organisms are affected by cell organisation. To understand how waves are produced and represent their common features.	GCSE AQA B2 P6	BTEC Unit 8 Assignment 8A musculoskeletal system	Practical skills report writing Critical evaluation Risk Assessment	Understand the role of Biomedical scientists, Professionals in the field of medicine and sports fitness. How waves are important in telecommunications globally locally.	Physical Education Technology
Unit 3 G1 Energy content of Fuels	To understand how energy is stored in various chemical stores, how energy density of substances varies and the application of correct fuels for their intended use.	GCSE AQA C5 C7	BTEC Unit 2 Assignment 2B calorimetry	Practical skills report writing Critical evaluation Risk Assessment	Role of fuels in industry and energy stores for power generation.	Technology, geography, economics.

Summer 1 communication and the electrical circuits that power them.						
Unit 1 C2 Waves in communication C3 Use of em waves in communication	To understand the role of waves in communications and how both analogue and digital signals can be created and used.	GCSE P6	BTEC Unit 1 External assessment	Practical skills report writing Critical evaluation Risk Assessment	Understand the applications of fibre optics in medicine and waves in Telecommunications.	Technology
Unit 3 H1 Electrical Circuits	To understand the role of electrical components and their properties in order to produce functioning and safe electrical circuits.	GCSE AQA P1 P2 P6 P7	BTEC Unit 1 External assessment Unit 1 C2 Waves in communication C3 Use of em waves in communication	Practical skills report writing Critical evaluation Risk Assessment	Electrical engineering and functions of everyday electrical items.	Technology Engineering
Summer 2 How the body moves and how we make electronics.						
Unit 2 A1 Laboratory equipment and its calibration	To understand laboratory procedures and techniques and why they are important	GCSE WS	BTEC Unit 3 External assessment Unit 1 C2 Waves, C3 Use of em waves in communication	Practical skills report writing Critical evaluation Risk Assessment	Careers, practical Science	Technology Engineering Maths
Unit 3 H1 Electrical Circuits	To understand the role of electrical components and their properties in order to produce functioning and safe electrical circuits.	GCSE AQA P1 P2 P6 P7	BTEC Unit 1 External assessment Unit 1 C2 Waves, C3 Use of em waves in communication	Practical skills report writing Critical evaluation Risk Assessment	Electrical engineering and functions of everyday electrical items.	Technology Engineering

Year 13 BIOLOGY: [How we exist and our living planet]

[How we work, who we are, how we use this and our place on the planet]

Topics	**Why we teach this**	**Links to last topic**	**Links to future topics**	**Key skills developed**	**Cultural capital opportunities**	**Links to whole school curriculum**
Autumn 1 [Who we are and why maintaining a balance is so important.]						

Respiration Survival and response Nutrient cycles and inheritance	To understand how we work and maintain a balance internally, with hormones. To know who we are and how nature maintains a balance.	Draws from KS3 DNA, ecology, KS4 B5 and year 12 human and plant biology	Links to heart, nerves and synapses, homeostasis and muscles.	Statistics, maths, extended response, application, making links, critical evaluation	Careers. Lab work. Environmental issues. Citizen Science. Medical science. Nuffield. Real world applications	Essay writing-English Geography -nutrient cycles and farming Maths- equations
Autumn 2 [How we work, how we came to be this way and how we use the knowledge]						
The heart, nerves and synapses. Evolution. Gene expression	To understand how our body communicates and maintains an heart rate. To understand how we came to be and how we use this knowledge.	Links to KS3 organs and DNA, KS4 B2, B5 and B6, year 12 genetics.	Links to genetic technology, homeostasis and muscles.	Statistics, maths, extended response, application, making links, critical evaluation	Careers. Lab work; dissection. Real applications; medical, Galapagos research	Essay writing-English History -where theories come from Maths- equations
Spring 1 [How we keep a balance, technology at the genetic level, from stem cells to genetic fingerprinting]						
Homeostasis Genetics and genetic technology	To understand how our bodies maintain a blood glucose balance and how we use genetic technology.	Links to KS4 B5 and B6, year 12 genetics	Links to homeostasis and muscles.	Statistics, maths, extended response, application, making links, critical evaluation, debate	Careers. Ethics. Lab work; working with animals. Real world applications; forensics, medical	Essay writing-English Maths- equations
Spring 2 [How we keep a water balance and coming full circle, drawing our knowledge together, to understand how we move]						
Homeostasis and populations Muscles	Using all prior knowledge to understand how our bodies maintain a water balance and how our muscles work.	Links to KS3 muscles, KS4 B5, all of year 12 and 13 so far.	Links to revision	Statistics, maths, extended response, application, making links, critical evaluation	Careers. Lab work; sampling, dissection. Real world applications; fitness industry. Zoo trip.	Essay writing-English History -where theories come from Maths- equations Sport- muscles
Summer 1 [The Science of memory]						
Revision	To retrieve, fill the gaps, apply and review. To learn how to retrieve.	Draws on all Biology.	Feeds into exams	Recall, apply, critically evaluate, maths, writing, data	All and any of the above.	English, Chemistry, Maths, Geography, History, Sport.

Summer 2 [Success]						
Exams	To succeed under pressure	ALL	Future study	ALL	Resilience.	As above

Year 13 CHEMISTRY: [Producing and Testing Useful Substances Economically]

[How we responsibly synthesise new and useful substances, control the process to our advantage and analyse what we make]

Topics	**Why we teach this**	**Links to last topic**	**Links to future topics**	**Key skills developed**	**Cultural capital opportunities**	**Links to whole school curriculum**
Autumn 1 [Manufacturing substances with Carbonyl groups (Part1) and understanding heat and work in chemical reactions]						
Aldehydes and Ketones Thermodynamics	To understand reaction mechanisms and their application to make new substances and to understand the interactions between heat and work in chemical reactions.	KS4 – C3, C4, C7, P1, C5 and C6. Year 12 –Intro. to organic, Bonding, Energetics, Year 13 nomenclature, Equilibrium constants	Links to all functional group topics, organic synthesis and analysis.	Maths, interpretation, application, practical work, making links, critical evaluation	Careers, Lab work, Industrial applications, Engineering, Medical science. Pharmaceutical	Physics, Maths, English, Business, Economics, German
Autumn 2 [Manufacturing substances with a carbonyl group (Part 2), benzene chemistry and using electricity for synthesis]						
Carboxylic acids / derivatives, aromatics, amines and Electrode potentials/cells	To understand reaction mechanisms and their application to make new substances and the role of electrochemistry in this.	KS4 – C3, C4, C7, P2 Year 12 –Intro. to organic, Bonding, Redox reactions. Year 13 – nomenclat.	Links to all functional group topics, organic synthesis and analysis, Periodicity.	Maths, interpretation, application, practical work, making links, critical evaluation	Careers, Lab work, Industrial applications, Engineering, Medical science. Pharmaceutical.	Physics, Biology, Maths, English, German, Business, Economics
Spring 1 [How Natural and Synthetic Polymers are produced and how acid- base reactions are useful]						
Polymers, amino acids, protein, DNA and Acids, Bases, pH	To understand the production of natural and synthetic polymers useful to humans and they are disposed of responsibly. How pH is measured and how acid – base reactions are useful.	KS4 – C3, C7, B6, C4 Intro. to organic, Amount of substance, Bonding, Energetics, nomenclature and equilibrium	Links to all functional group topics, organic synthesis and analysis.	Maths, extended response and interpretation, application, practical work, making links, critical evaluation	Careers, Lab work, Industrial applications, Environmental, Engineering, Medical science. Pharmaceutical.	Biology, Maths, English, German, Business, Economics.

Spring 2 [What an organic substance is made of, how it is converted, patterns in the periodic table and the chemistry and uses of transition metal complexes?						
Organic synth/ analysis, NMR, Chromatography, Period 3 elements, transition metals, ligands.	To understand techniques to analyse organic substances, convert one substance to another, chemical patterns and uses of transition metals.	KS4 – C1, C2, C3, C4, C7, C8 Year 12 - Intro. to organic, Amount of substance, All Inorganic and organic	Links all topics together for revision.	Maths, extended response and interpretation, application, practical work, making links, critical evaluation	Careers, Lab work, Industrial applications, Environmental, Engineering, Medical science. Pharmaceutical.	Biology, Maths, English, German, Business, Economics.
Summer 1 [Retrieval and Application]						
Revision	To retrieve, fill the gaps, apply and review. To learn how to retrieve.	Links all chemistry.	Feeds into A chemistry level exams	Recall, apply, interpret, critically evaluate, maths, data, practical skills.	Transition to a university degree or apprenticeship, employability.	Biology, Physics, Maths, English, History, German, Business, Economics, Life skills.
Summer 2 [Organisation, Confidence and Success]						
Exams	To succeed under pressure	All	Future study	All	Time management, resilience.	As above

Year 13 PHYSICS: [Unifying concepts in physics]

[Bringing together physics learned to develop ideas of force fields and the Universe]

Topics	**Why we teach this**	**Links to last topic**	**Links to future topics**	**Key skills developed**	**Cultural capital opportunities**	**Links to whole school curriculum**
Autumn 1 [Understand one of the great unifying ideas in physics - field]						
Fields and their consequences	To develop the ideas of gravitation, electrostatics and magnetic field theory. Further development of many ideas from mechanics and electricity.	GCSE P1 Energy P2 Electricity P5 Forces P7 Electromagnetism Year 12 mechanics & further mechanics Year 12 electricity	Astrophysics	Maths skills, recall, understanding & application of knowledge, practical skills	Careers. Lab work. How ideas change. Real world applications: planetary and satellite orbits, proton beam therapy, spectroscopy	Maths History – newton's laws of gravitation Chemistry - spectrometer

Autumn 2 [Understand one of the great unifying ideas in physics - field]						
Fields and their consequences	To develop the ideas of gravitation, electrostatics and magnetic field theory. Further development of many ideas from mechanics and electricity.	GCSE P1 Energy P2 Electricity P5 Forces P7 Electromagnetism Year 12 mechanics & further mechanics Year 12 electricity	Astrophysics	Maths skills, recall, understanding & application of knowledge, practical skills	Careers. Lab work. How ideas change. Real world applications: planetary and satellite orbits, proton beam therapy, spectroscopy	Maths History – newton's laws of gravitation Chemistry - spectrometer
Spring 1 [Nuclear energy production and the impact that it can have on society]						
Nuclear physics	To link the properties of the nucleus to the production of nuclear power through the characteristics of the nucleus, the properties of unstable nuclei, and the link between energy and mass.	GCSE P4 Atomic structure Year 12 Particles and radiation	Revision	Maths skills, recall, understanding & application of knowledge, practical skills	Careers. Lab work. How ideas change. Environmental issues. Energy resources. Real world applications	Maths History – atomic model, Rutherford experiment Biology – medical physics
Spring 2 [The application of fundamental physical principles to the study and interpretation of the Universe]						
Astrophysics	To gain deeper insight into the behaviour of objects at great distances from Earth and discover the ways in which information from these objects can be gathered.	GCSE P8 Space physics Year 12: mechanics, waves, particles & radiation Year 13: further mechanics, fields	Revision	Maths skills, recall, understanding & application of knowledge, practical skills	Careers. Lab work. How ideas change. Real world applications. History. NASA. ESA. Engineering.	Maths History – development of ideas about Earth's place in Universe, telescopes, Hipparchus
Summer 1 [Revision]						
Revision	To retrieve, fill the gaps, apply and review. To learn how to retrieve.	All	Exam	Maths skills, recall, understanding & application of knowledge, practical skills Recall, apply, critically evaluate, maths, writing, data	All of the above	All of the above
Summer 2 [Exam]						
Exam	To succeed under pressure	All	Future studies	All	resilience	All of the above

Year 13 BTEC: [Learning to apply Science]

[Science skills]

Topics	**Why we teach this**	**Links to last topic**	**Links to future topics**	**Key skills developed**	**Cultural capital opportunities**	**Links to whole school curriculum**
Autumn 1 [Investigative skills and cooling curves]						
Unit 3A Planning a scientific investigation Unit 2B Undertake calorimetry to study cooling curves	To understand how to plan an investigation To understand how to calibrate equipment and observe a cooling curve	BTEC Unit 1 WS BTEC Unit 1 Chemistry	BTEC Unit 3 Assessment BTEC Unit 2 BTEC Unit 8	Practical skills report writing Critical evaluation Risk Assessment	Careers, lab work, analytical thinking and problem solving	Maths- calculations English- writing reports
Autumn 2 [Investigation and chromatography]						
Unit 3B Data collection, processing and analysis/interpretation C Drawing conclusions and evaluation Unit 2C Undertake chromatographic techniques to identify components in mixtures	To understand how to collect data from an investigation, analyse and evaluate it To understand how to calibrate equipment and conduct chromatographic techniques	BTEC Unit 1 WS BTEC Unit 1 Chemistry	BTEC Unit 3 Assessment BTEC Unit 2 BTEC Unit 8	Practical skills report writing Critical evaluation Risk Assessment	Careers, lab work, analytical thinking and problem solving	Maths- calculations English- writing reports Art-pigments
Spring 1 [Physiology and reflection]						
Unit 8 Physiology of Human Body Systems Teaching Unit 2D Review personal development of scientific skills for laboratory work	To understand the physiological, make up of three human body systems (musculoskeletal, lymphatic and digestive), how the systems function and what occurs during dysfunction. To understand how to reflect on past work and learn from it	GCSE AQA B2 B5 BTEC Unit 1 WS BTEC Unit 1 Chemistry BTEC Unit 3	BTEC Unit 2 BTEC Unit 8	Practical skills report writing Critical evaluation Risk Assessment	Careers, lab work, analytical thinking and problem solving Understand the role of Biomedical scientists, Doctors and the professionals in the field of medicine and sports fitness.	Physical Education Maths- calculations English- writing reports

Spring 2 [Muscles, bones and brain cells]						
Unit 8 Physiology of Human Body Systems A1 Structure of the musculoskeletal system Resit revision	To understand the physiological, make-up of the musculoskeletal systems, how it functions and what occurs during dysfunction. To understand how to reflect on past work and learn from it	GCSE AQA B2 B5 BTEC Unit 1 WS BTEC Unit 1 Chemistry BTEC Unit 3	BTEC Unit 8 Resits	Practical skills report writing Critical evaluation Risk Assessment	Careers, lab work, analytical thinking and problem solving Understand the role of Biomedical scientists, Doctors and the professionals in the field of medicine and sports fitness.	Physical Education Maths- calculations English- writing reports
Summer 1 [Lymphatic system and revision]						
Unit 8 Physiology of Human Body Systems B1 Structure of the lymphatic system Resit revision	To understand the physiological, make-up of the lymphatic system, how it functions and what occurs during dysfunction. To understand how to reflect on past work and learn from it	GCSE AQA B2 B5 BTEC Unit 1 WS BTEC Unit 1 Chemistry BTEC Unit 3	BTEC Unit 8 Resits	Practical skills report writing Critical evaluation Risk Assessment	Careers, lab work, analytical thinking and problem solving Understand the role of Biomedical scientists, Doctors and the professionals in the field of medicine and sports fitness.	Physical Education Maths- calculations English- writing reports
Summer 2 [Digestion and revision]						
Unit 8 Physiology of Human Body Systems C1 Structure of the digestive system Resit revision	To understand the physiological, make-up of the digestive system, how it functions and what occurs during dysfunction. To understand how to reflect on past work and learn from it	GCSE AQA B2 B5 BTEC Unit 1 WS BTEC Unit 1 Chemistry BTEC Unit 3	BTEC Unit 8 Resits	Practical skills report writing Critical evaluation Risk Assessment	Careers, lab work, analytical thinking and problem solving Understand the role of Biomedical scientists, Doctors and the professionals in the field of medicine and sports fitness.	Physical Education Maths- calculations English- writing reports