

CURRICULUM PLAN

Department: Science

Vision Statement:

US: To design and deliver a curriculum that enables us to inspire excellence, critical thinking and engage science students.

STUDENTS: To educate and inspire the next generation of independent, critical thinking, scientifically literate young adults.

Our intent is the knowledge we share with students.

Strapline:

Why? Because Science is Everything!

Curriculum Story:

From the atomic to the cosmic! We start with atoms and particles, the building blocks of everything, and build towards an understanding of the Earth and Space, returning to build on these ideas at KS4. This journey is underpinned by the Big Ideas in Science linking the knowledge we teach.

Skills developed:

In Science students learn how to apply knowledge and critically evaluate ideas and data. Students will make progress in their data handling skills as well as at making links. Students gain experience in a range of practical skills alongside scientific literacy and numeracy. Scientists make great problem solvers.

Year 7: [Science is everything] [From atoms to machines]						
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 is everything made of?]						
Scientific Enquiry CRITICAL, ENQ Particles IC, PRAC Atoms, Elements, and compounds IC, PRAC	So we understand how scientific investigations are carried out and used in the real world To learn what particles are and how everything is made of them To understand the impact of Chemistry on our everyday lives. To know what matter is made of To know how to separate mixtures	Draws on KS2 Sciences and real-world observation Draws on particles and scientific enquiry	Feeds into Atoms, elements, compounds and purity, cells and reproduction Feeds into cells, forces, energy, motion and pressure, earth and atmosphere and space	Application of knowledge, making links, practicals, ethical debate, critical evaluation, collecting data, making predictions using scientific knowledge	Lab work: practical science. Careers in lab work, forensics, genetics, counselling. Pharmacy, developing new drugs, agriculture, industry Chemists-in the drug industry	Maths in scientific enquiry. Art particle diagrams. English, debate where particles came from. History: how did it all begin? The discovery of elements. D&T-food tech Maths-making calculations
Autumn 2 [The importance of atoms for us to exist]						
Cells AUTO, CSF Reproduction IC, ENQ	So we understand the building blocks of life To learn the role of reproduction in animals and plants.	Draws on Particles and Scientific enquiry, atoms and KS2	Feeds into all biology	Application of knowledge, making links, practical science, critical evaluation, making predictions using scientific knowledge and understanding	Biologists, genetics, doctors, medical scientists, careers, history, equality and diversity, health	History: microscopy Maths: magnification PSHE: reproduction Art-making 3D cell models
Spring 1 [What are we made of and how were we made?]						
Forces FLEX T, PRAC	To understand the impact of physics on our lives and how it works. What are forces and what they do?	Draws on Particles and Scientific enquiry,	Feeds into magnets, motion and pressure, energy and space	Application of knowledge, making links, practical science, critical evaluation	Lab work. Careers. Astronauts, how force affect space travel and in sports.	Maths in physics, drawing tables, and making force calculations.
Spring 2 [How forces affect sports and space travel]						
Energy CONNECT, CSF	To understand what energy is and how it works	Draws on KS2 Sciences, particles and KS2	Feeds into all physics, biology and chemistry	Recall, apply, critically evaluate, maths, writing, Present observations and data using appropriate methods	Careers, history, ethics of using resources, social/ economic/ environmental impact, car safety, machines and engineering	Maths in physics, drawing tables, and making force calculations. DT: design
Summer 1 [How physics shapes the way we live]						
Motion and pressure MC, ENQ	To understand how speed works and how air affects us	Draws on forces, particles, energy and cells.	Feeds into magnetism and Forces P5.	Recall, apply, critically evaluate, maths, writing, Present observations and data using appropriate methods	Careers, history, ethics of using resources, social/ economic/ environmental impact, car safety, machines and engineering	Maths: tables, and energy calculations. DT: design
Summer 2 [How things move]						
Skeleton and gas exchange MC, PRAC Digestion and Health IC, CSF	To understand movement, how organisms' function, how systems work together, how and why it is important to stay healthy	Draws on forces, particles, energy and cells.	Feeds into Cells B1, Organisation B2, Infection B3, Bioenergetics B4 and Homeostasis B5	Recall, apply, critically evaluate, biological drawing, maths, writing, present observations and data using appropriate methods and examining risk factors	Careers, history, equality, diversity, ethics of using resources, social/ economic/ environmental impact, drugs and nutrition.	PE – physical health, movement and fitness Food Tech – healthy diet

Year 8: In the World

Everything from how organisms' function, stay healthy and pass on their genes, to how chemicals react and how waves travel.

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 – In the lab- Chemicals						
Periodic table CONNECT, PRACT Chemical reactions CRITICAL, ENQ	Development, discovery and uses of the elements through time. How the scientific community works together How and why chemical reactions occur. Reactivity of elements	Atomic structure Atomic structure, particles and periodic table organisation	GCSE: Atoms C1, Bonding C2, Quantitative C3, Analysis C8, Atmosphere C9, Atoms P4 GCSE: C1, C2, C3, Changes C4, Energy C5, Rate C6, Organic C7, C9, Resources C10 and P4	Analysis, communication, enquiry, examining risks, scientific drawing, working scientifically (WS) – practical skills	Careers, history, industry, environmental, change and development of ideas over time	History – How medicine changed over time Food Tech – Physical and chemical changes (cooking and dissolving) Maths – Balancing equations, means, adding negative/positive numbers
Autumn 2 – In the hospital – Waves						
Waves: sound and light MC, CFS	How do we hear and see? Importance of waves in everyday life: cleaning, communication, medical	Particles, motion and pressure, skeleton & gas exchange	GCSE: Particles P3, Atoms P4 and Waves P6	Analysis, Communication, Enquiry, Evaluating risk factors	Careers, history, communication, health	IT – Communication Music – Sound Maths – speed
Spring 1 – In industry – Reactions						
Metals and acids AUTO, ENQ	Properties and uses of metals	Chemical reactions, Periodic table, energy, forces	GCSE– Atoms C1, Bonding C2, Quantitative C3, Changes C4, Energy C5, Particles P3 and Atoms P4	Analysis, communication, maths, WS, practical skills, enquiry, data, risk, scientific drawing	Careers, history	DT – Material properties
Spring 2 – Populations - Genetics						
Inheritance IC, CFS	What makes you, you and where those traits come from. Understanding evolution and adaptations	Cells and reproduction	GCSE topics – Cells B1, Infection B3, Inheritance B6 and Ecology B7.	Communication, ethical considerations, analysis, critique	Careers, history, equality, health diversity, ethics,	RE – Evolution v. Creation English – Ethical debate History – Evolution Geography – Fossils
Summer 1- What concepts and ideas make useful devices and machines work?						
Microbes IC, PRAC Magnetism CONNECT, PRAC	To show how physics relates to the real world on both smaller and larger scales, how these concepts make life easier for humans and how they can be applied.	Links to cells, health, particles, forces and atoms	GSCE topics- B3 Disease. Space and GCSE topics P2, P5 P6, P7 – Electricity, Forces, Magnets, Waves	Application of knowledge, making links, practical work, experimental design debate, critical evaluation, life skills.	Practical work, health. Careers in industry and engineering, design, skills and apprenticeships.	Maths – equations, DT – design skills English – debate. History – Development over time Life skills – staying healthy
Summer 2 – Application in the world						
Relationships CONNECT, CFS Science fair ORIGINALITY, ENQ	To show the interdependence of living things and the planet How to be a scientist!	Can be linked to any and all topics.	Can be linked to any and all future topics depending on chosen project	Planning, enquiry, analysis, review, WS, practical skills, data communication,	Careers	Anything and everything across the curriculum!

Year 9: [Atomic to Cosmic and things in- between]

[What are we made of, how are we organised and how do we function in the universe to survive?]

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 concepts and ideas make useful devices and machines work?]						
Relationships. Earth's Atmosphere CONNECT, CFS	To understand the interactions of organisms and the planet and how they affect each other.	Cells, digestion, health, skeleton, gas exchange, chem. reactions, repro, electricity, atoms, periodic table, forces	B1, B2, B4, B7 C9, C10 P5, P8	Application of knowledge, making links, practical work ethical and environmental debate, critical evaluation.	Practical work, Careers in industry, engineering, environment, politics.	English – ethical debate, Geography – Environment, Maths – Interpreting – graphs.
Autumn 2 [How do the earth and the cosmos interact and influence each other?]						
Space CONNECT, ENQ	To understand our place in the Universe.	Forces, motion and pressure	P5, P8	Application of knowledge, making links, modelling, critical evaluation.	Practical work, Careers in industry, engineering, environment.	Maths – Interpreting – data.
Spring 1 [What are the building blocks of living and non-living things?]						
AQA GCSE C1 Atoms IC, PRACT P3 Particles	To understand what all matter is made of	Builds on Particles, Energy / Heat, Forces, Electricity, Motion and Pressure.	All biology, chemistry and physics	Application of knowledge, making links, practical work, critical evaluation, design skills	Practical work, Careers in industry, engineering, environmental, politics.	Maths – Equations, English, DT -Design
Spring 2 [What are the building blocks of living and non-living things?]						
C2 Bonding CRITICAL, ENQ	In what different ways are atoms held together?	Builds on particles, Atoms, Chemical reactions, C1 –Atoms,	C3, C4,	Application of knowledge, making links, practical work, critical evaluation.	Practical work, Careers in industry, engineering, pharmacy, medicine.	Maths - Numerical skills, English – Explanations.
Summer 1 [How do the building blocks of living things function together?]						
AQA GCSE B1 Cells AUTO, CFS	To understand the structure and function of the basic units that living and non- living entities are made up of.	Builds on cells, gas exchange, atoms, periodic table, forces, waves	Links to all biology, P4, P8.	Knowledge application, making links, practical work, critical evaluation, observational skills.	Practical work, Careers in industry, engineering, microbiology, medicine health care.	English – Ethical debate, Maths – Numerical skills History – development over time. PE – anatomy and the body.
Summer 2 [How are all things held together?]						
B2 Organisation IC, CFS	How do cells work together to allow living things to operate effectively?	Builds on gas exchange, health, B1.	B4, B5	Application of knowledge, making links, practical work, evaluation.	Practical work, Careers in industry, medicine, environmental awareness	Maths – Graphs, PE – body, English – Interpretation, DT – Food

Year 10 Combined: [Learning the effect of invisible on us] [Understanding body, reactions and abstract ideas using Science]						
<u>Topics</u>	<u>Why we teach this</u>	<u>Links to last topic</u>	<u>Links to future topics</u>	<u>Key skills developed</u>	<u>Cultural capital opportunities</u>	<u>Links to whole school curriculum</u>
Autumn 1 [The effect of the invisible on us using biology and how light is generated in our homes]						
C3: Quantitative CRITICAL, ENQ B3: Infection IC, CSF	So we can understand how science can be used in industries to yield samples So we can understand how pathogens cause infectious diseases in animals and plants.	Draws on C1 atoms, compounds, C2 balancing equations, chemical formulae, properties of matter. Draws on B1 cells and specialised cells, B2 organisation and blood.	Feeds into B5, B6 Feeds into C6, C7, C8	Application of knowledge, making links, ethical debate, critical evaluation	Personal hygiene, preventing spread of diseases, antibiotics, pandemics, vaccinations, drug discoveries. Working in labs, careers, sampling, forensics, purity	History of hygiene and spread of disease, Design and technology, ICT, food hygiene, Life skills. Food, Maths in Chemistry, life skills, D+T materials
Autumn 2 [How basic building blocks shapes everything and how we change with Chemistry]						
P4: Atoms IC, PRAC B4: Bioenergetics CONNECT, CFS	So we can understand how knowledge of radioactivity can be used as an energy source and to limit risk of exposure. So we can understand how science explains how plants make food and how energy is created in our body.	Draws on C1 atomic structure, P1 energy, P2 electricity Draws on B1 Cell structure, B2 Plant organisation, respiratory system, B3 need of correct organelles.	Feeds into P6, B6, B7	Application of knowledge, making links, practicals, ethical debate, critical evaluation	Biologists, Landscaper, mining, extractors, oil use, construction, biochemists, dietician, health coaches, fitness coaches	PE, food, D+T, Geography
Spring 1 [From the chemistry of producing and using energy to the biology of plants, how chemistry extracts what the Earth produces]						
C4: Changes CRITICAL, ENQ P1: Energy IC, PRAC	So we understand how science is used to extract metals to build everyday materials and even jewellery. So we understand what keeps the planet and technology running	Draws on C1 reactivity of alkali metals, C2 ionic bonding, C1 atoms	Feeds into C5, C6, C8, all physics	Application of knowledge, making links, practical Science, ethical debate, critical evaluation	Laboratory, practicals, engineering and design, social, economic and environmental issues.	D+T
Spring 2 [The Physics of atoms that make up everything and their use in the current world]						
P2: Electricity CMS, PRAC	So we can understand how science can identify environmental issues arising from the use of energy resources	Draws on P1 energy, conservation, power	Feeds into P5, P7	Application of knowledge, making links, practicals, ethical debate, critical evaluation	National grid, Energy Conservation, radioactive protection. Use of radioactive material in medicine, agriculture and electrical power generation.	History (nuclear war), D+T materials
Summer 1 [The complexity of the human body, to which we are oblivious]						
C5+6: Rates CONNECT, CFS B5: Homeostasis IC, ENQ	So we can understand how science can slow or speed up reactions by just changing settings So we can understand how body monitors all internal functions.	Draws on B2 organisation, B4 Bioenergetics, C1 atoms, halogens, C2 bonding, C4 changes	Feeds into B6, B7, C9, C10	Application of knowledge, making links, practical Science, ethical debate, critical evaluation	Health, Medicine, knowledge of contraception, healthy eating	Life skills,
Summer 2 [Using chemistry; making more from less; from fireworks to forensics]						
C7+8: Organic Analysis AUTO, ENQ	So we understand how chemistry is used in the real world on the small scale	Draws on C1 atomic structure, halogens, C2 Bonding, C4 chemical changes	Feeds into C9, C10	Application of knowledge, making links, practical Science, ethical debate, critical evaluation	Lab work: practical science. Careers in lab work, forensics, genetics, counselling.	Maths in chemistry. Art in chemistry.

Year 10 Separate: [Exploring how the body works and the world around us]

[From atoms to viruses to power stations]

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 [From viruses to power stations]						
B3 Infection IC, CFS C3 quantitative CRITICAL, EMQ B4 bioenergetics CONNECT, CFS	So we understand pathogens and how to cure and prevent diseases To explore the ways chemicals, make certain compounds To know the chemistry of the body	Draws on B1: cells and B2: organisation Draws on C1 atoms and C2 Bonds Draws on P1: energy	Feeds into B4 bioenergetics and B5 Homeostasis Feeds into C4 changes Feeds into P3 particles	Application of knowledge, making links, ethical debate, critical evaluation	History of different discoveries Lab work, careers, Real world	Maths in chemistry and physics. History of medicine Debate in RE
Autumn 2 [The atomic model, how does it work?]						
Working scientifically P4 atoms IC, PRAC P2 electricity CMS, PRAC	To explore how we conduct practicals safely and effectively To explore how things are made So we understand how electricity is produced and how to make it environmental friendly	Draws on P3 particles and C1 atoms	Feeds into P1 energy, P5 forces	Application of knowledge, making links, ethical debate, critical evaluation	Lab work, career, communication	Maths in physics English writing reports
Spring 1 [What happen when chemicals bond and chemistry in life]						
C4 changes CRITICAL, ENQ C5 energy CRITICAL, ENQ	To explore what happens when chemicals react	Draws on P3 particles Draws on C1 atoms and C2 bonds	Feed into P5 forces Feeds into C6 rate	Application of knowledge, making links, ethical debate. critical evaluation	Lab work, career, communication, engineering	Maths in drawing graphs and chemical calculations English writing report History of atomic structure
Spring 2 [How the body maintains optimum conditions and how things move]						
P1 Energy IC, PRAC P5 Forces FLEX T, PRAC	To explore how things move and the impact forces have on our lives and society	Draws on P1 energy, P2 electricity, P3 particles, P4 atoms	Feeds into P6, P7 and P8	Application of knowledge, making links, ethical debate. critical evaluation	Lab work, career, Communication. engineering	Maths drawing and interpreting graphs, equations. Art drawing forces
Summer 1 [How your body works and how forces act]						
B5 homeostasis IC, ENQ P5 Forces FLEX T, PRAC C6 rates CRITICAL, ENQ	So we understand how our body works So we understand the ways in which we can slow down or speed up a reaction	Draws on B1 cells and Organisation B2 Draws on P1 energy	Feeds into P5 part2 Feeds into B6 Feeds into C7	Application of knowledge, making links, ethical debate, critical evaluation	Lab work, Medicine, how ideas have changed engineering	Maths drawing and interpreting graph Art drawing forces PE maintain a stable body temperature and train to work under certain conditions
Summer 2 [How chemistry and physics apply to the real world]						
C7 Organic CRITICAL, ENQ P5 Forces FLEX T, PRAC	So we understand how chemistry is used in the real world So we know how things move to perform a job	Draws on C1 to C6 Draws on P1 energy	Feeds into B6 inheritance Feeds into P6 waves	Application of knowledge, making links, ethical debate, critical evaluation	Lab work, medicine, how ideas changed engineering	Drawing organic compound Art Maths calculation and drawing graphs

Year 10 ELC: [Learn how building blocks shape our world]

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 [From cell to organism]						
Unit 3 – Elements, mixtures and compounds – Atoms, Elements, Compounds, Metals and Non-metals. IC, PRAC	To understand how chemistry is used in the world around us.	Draws on KS3 atoms, elements and compounds. Metals and acids.	Links to mixtures and separating techniques.	<ul style="list-style-type: none"> Practical skills - TDA Knowledge Making links Working with others Evaluation Maths 	<ul style="list-style-type: none"> History Careers Real world application Engineering Sharing information Industry	<ul style="list-style-type: none"> D+T Maths Art English
Autumn 2 [How the body fights disease and coordinates itself]						
Unit 3 – Elements, mixtures and compounds – Chemical reactions, States of matter, Particle theory, Mixtures, Separating mixtures, Properties of metals, Recycling, Alloys AUTO, ENQ	To understand how elements, mixture and compounds help chemists with a structured organisation of the known chemical elements from which they can make sense of their physical and chemical properties	Draws on KS3 atoms, elements and compounds. Metals and acids.	Links to energy and forces.	<ul style="list-style-type: none"> Practical skills - TDA Knowledge Making links Working with others Evaluation Maths 	<ul style="list-style-type: none"> History Careers Engineering Change of ideas over time Impact on the environment and society 	<ul style="list-style-type: none"> D+T Maths Art History Geography English
Spring 1 [Chemistry and the material world]						
Unit 1 – The human body – Cells, specialised cells, Tissues, Organ & Organ & Circulatory systems, Digestive system. MC, PRAC	To understand what the body is made of and how organs systems work together	Draws on KS3 cells, digestion and health.	Links to gas exchange and healthy lifestyle.	<ul style="list-style-type: none"> Practical skills - TDA Knowledge Making links Working with others 	<ul style="list-style-type: none"> Careers Nutrition Equality and diversity Lab work 	<ul style="list-style-type: none"> PE Health and social English D+T- Food Technology
Spring 2 [Classification of matter]						
Unit 1 – The human body – Enzymes, Respiration, and Gas exchange, Healthy lifestyle, Infectious diseases, Vaccination and Drugs. IC, CFS	<p>To understand the cellular process of releasing energy from food through a series of enzyme-controlled reactions.</p> <p>To understand how our body defends us against infectious diseases and why medical drugs are developed.</p>	Links to ELC Unit 1 cells and the digestive system. How drugs affect the human body and KS3 gas exchange.	Links to mixtures and compounds found in drugs.	<ul style="list-style-type: none"> Practical skills - TDA Knowledge Making links Working with others Maths Debate	<ul style="list-style-type: none"> History Careers Health Social, ethical Engineering Real world applications 	<ul style="list-style-type: none"> Health and social D+T – Food Technology English History PE
Summer 1 [How energy helps us in our daily lives]						
Unit 5 – Energy, forces & structure of matter – Energy stores, Energy transfer, Conservation of energy, Wasted energy, Energy resources, Heat transfer, Renewable & Non renewable CONNECT, CFS	<p>To understand how energy changes in a system and the ways energy is stored before and after such changes.</p> <p>To Distinguish between energy resources that are renewable and energy resources that are non-renewable.</p>	Links to unit 3 (Particles) and KS3 energy and energy resources.	Links to next part of the unit (5) forces – Work done.	<ul style="list-style-type: none"> Practical skills - TDA Knowledge Making links Working with others Maths Evaluation 	<ul style="list-style-type: none"> Careers Equality and diversity Engineering Machines Using resources (Ethics) 	<ul style="list-style-type: none"> D+T Geography Maths
Summer 2 [The Physical world]						
Unit 5 – Energy, forces & structure of matter – Contact & Non-contact forces, Work done, Stopping distances, Speed, Atomic Nuclei, Ionising radiation FLEX T, PRAC	<p>To understand how forces can be used to change the motion of an object.</p> <p>To understand why each type of electromagnetic wave is suitable for the practical application.</p>	Links to KS3 forces and Waves.	Links to Year 11 ELC – Electricity, Magnetism and waves.	<ul style="list-style-type: none"> Practical skills - TDA Knowledge Making links Working with others Evaluation Maths 	<ul style="list-style-type: none"> Careers History Engineering History Machines 	<ul style="list-style-type: none"> D+T History Maths PE
Year 11 Combined: [Learning how the world works]						

[Bringing together everything we have learned to make links]

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 [Why we are who we are]						
P5 Forces FLEX T, PRAC	So we understand the impact of physics on our lives and how it works.	Draws on P1-4 principles	Feeds into P7	Application of knowledge, making links, practical science, critical evaluation	Lab work. Careers. Sampling, communication. Environmental issues.	Maths in physics. Geography in biology.
Autumn 2 [How physics shapes us and how we shape the planet]						
P6 Waves MC, CFS B6 Inheritance IC, CFS	So we understand the impact of physics on our lives and how it works So we know where we came from, as a species and an individual.	Draws on P1-5 physics principles. Draws on B1 cells & B2 organisation	Feeds into P7 and B7	Application of knowledge, making links, practical Science, ethical debate, critical evaluation	Lab work: practical science. Careers in lab work, forensics, genetics, counselling. Show real lab work. Biology-real world.	English, debate in biology. History: genetics through history
Spring 1 [Why Chemistry and Physics are more important than you think!]						
P7 Magnetism & Electromagnetism CONNECT, PRAC B7 Ecology CONNECT, CFS	So we understand the impact of physics on our lives and how it works. So we understand our place in + impact on the world	Draws on P1-6 physics principles Draws on B1-6 biology principles	Feeds into revision	Application of knowledge, making links, practical science, critical evaluation	Lab work. Careers. Communication. Climate change and finite resources. Environmental impact and solutions.	Maths in physics.
Spring 2 [How physics shapes us]						
C9 & 10 Chemistry of the atmosphere & Using resources CONNECT, CFS	To understand the impact of Chemistry on our everyday lives.	Draws on all Chemistry, B7 ecology, B4 Bioenergetics, P6 waves	Feeds into revision	Application of knowledge, making links, practical science, critical evaluation	Lab work. Careers. Real world applications. Climate change and finite resources.	Geography-climate change. History of the atmosphere. D+T materials
Summer 1 [The science of memory]						
Revision CONNECTION, PRACTICE	To retrieve, fill the gaps, apply and review. To learn how to retrieve.	Draws on all Science.	Feeds into exams	Recall, apply, critically evaluate, maths, writing, data	All and any of the above.	English, Maths, Geography, History, D+T, ICT, Sport etc.
Summer 2 Success						
Exams	To succeed under pressure	ALL	Future study	ALL	Resilience.	As above
Year 11 Separate: [Learning how the world works]						

[Bringing together everything we have learned to make links]						
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 [Using Science; from fireworks to motors and why we are who we are]						
P6 Waves MC, CFS C8 Chemical analysis CRITICAL, ENQ P7 Electromagnetism CONNECT, PRAC	So we understand the impact of physics on our lives and how it works. To understand how chemistry and physics are used in the real world on the small scale.	Draws on P1-5 physics principles, Draws on C1, C2, C3, C4, C5, C6, C7 and P1-5	Feeds into P8, C9, C10	Application of knowledge, making links, practical Science, ethical debate, critical evaluation	Lab work: practical science. Careers in lab work, forensics, genetics, counselling. Show real lab work. Biology-real world.	Maths in chemistry. Art in chemistry. English, debate in biology. History: genetics through history
Autumn 2 [How physics shapes us and how we shape the planet]						
B6 Inheritance IC, CFS B7 Ecology CONNECT, CFS	To know where we came from, as a species and an individual. So we understand our place in + impact on the world	Draws on B1-6 biology principles	Feeds into C10 and P8	Application of knowledge, making links, practical science, critical evaluation	Lab work. Careers. Sampling, communication. Environmental issues.	Maths in biology. Geography in biology.
Spring 1 [From water to buildings via food, how Chemistry is more important than you think!]						
C9 Atmosphere CONNECT, CFS C10 Resources CONNECT, CFS	To understand the impact of Chemistry on our everyday lives.	Draws on all Chemistry, B7 ecology, B4 Bioenergetics, P6 waves	Feeds into P8	Application of knowledge, making links, practical science, critical evaluation	Lab work. Careers. Real world applications. Climate change and finite resources.	Geography-climate change. History of the atmosphere. D+T materials
Spring 2 [Cosmic]						
P8 Space CONNECT, ENQ	To understand our place in the Universe.	Draws on all physics, C1 atoms chemical equations	Feeds into revision	Application of knowledge, making links, practical science, critical evaluation	History. Careers. How ideas change. Real world Science. NASA. ESA. Engineering.	History of the Universe.
Summer 1 [The science of memory]						
Revision CONNECT, PRAC	To retrieve, fill the gaps, apply and review. To learn how to retrieve.	Draws on all Science.	Feeds into exams	Recall, apply, critically evaluate, maths, writing, data	All and any of the above.	English, Maths, Geography, History, D+T, ICT, Sport etc.
Summer 2 Success						
Exams	To succeed under pressure	ALL	Future study	ALL	Resilience.	As above
Year 11 ELC: [The past, present and future of planet Earth] [Making scientific links]						

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 [One of the fundamental forces of nature]						
Unit 6 – Electricity, Magnetism and Waves – Current & Charge, Electric circuits, Voltage & resistance, AC/DC, Mains electricity, Magnetic forces, Electromagnets, Current in a wire, Waves, wave properties EM waves CMS,PRAC	To understand how Electricity and magnetism are two related phenomena produced by the electromagnetic force. Together, they form electromagnetism.	Draws on unit 5 – Radiation	Feeds into Unit 4	<ul style="list-style-type: none"> • Practical skills - TDA • Knowledge • Making links • Working with others • Maths • Evaluation 	<ul style="list-style-type: none"> • Careers • History • Engineering • Machines • Communication • TDA 	<ul style="list-style-type: none"> • Maths • D+T
Autumn 2 [Chemistry in our world]						
Unit 4 – Chemistry in our world – Acids and metals, Gas tests, Crystallisation, Neutralisation, Rates of reaction, Exothermic and endothermic, CRITICAL, ENQ	To understand how Acids react with metals, alkalis and bases to produce compounds. To understand how Chemical reactions can be made to go faster or slower by changing the conditions.	Draws on principles from unit: 1 – The human body 3 – Elements, mixtures and compounds 5 – Energy, forces and structure of matter	Links to Exothermic and endothermic reactions/combustion	<ul style="list-style-type: none"> • Practical skills • Knowledge • Making links • Working with others • Evaluation • Maths 	<ul style="list-style-type: none"> • Careers • Engineering • TDA 	<ul style="list-style-type: none"> • Maths • D+T
Spring 1 [Chemistry of the atmosphere]						
Unit 4 – Chemistry in our world – Evolution of the atmosphere, The atmosphere, Fossil fuels, Fractional distillation, Combustion, Pollution, and Water. CONNECT, CFS	To understand the impact of Chemistry on our everyday lives and how human activity impacts the Earth	Draws on unit 4 – Rates of reaction	Links to the environment and the Carbon cycle	<ul style="list-style-type: none"> • Practical skills • Knowledge • Making links • Working with others • Evaluation • Maths 	<ul style="list-style-type: none"> • Careers • History • Engineering • Machines • Communication • TDA • Ethics 	<ul style="list-style-type: none"> • History • Geography • D+T • English
Spring 2 [Life on Earth]						
Unit 2 – Environment, Evolution & Inheritance – Photosynthesis, Adaptation, Food chains, Carbon cycle, Competition, Environment, Population growth, Evolution, Chromosomes, Natural selection, DNA, Reproduction, Genetic engineering. IC, CFS	To understand what biodiversity and the effect of human interaction on ecosystems is	Draws on Unit 1 – The human body (Cells)	Links to the environment and the Carbon cycle	<ul style="list-style-type: none"> • Practical skills - TDA • Knowledge • Making links • Working with others • Maths • Debate 	<ul style="list-style-type: none"> • Careers • Equality and diversity • Ethics • Lab work • Environmental issues 	<ul style="list-style-type: none"> • History • English • Maths
Summer 1 [Portfolio preparation]						
Portfolio ready and Externally set assessments CONNECT, ENQ	To prepare for ESAs and submit evidence for all 6 components	Draws on all topic covered over two years – Students will sit 6 ESAs + submit 6 TDAs	Feeds into exams and TDA's	<ul style="list-style-type: none"> • Recall • State • Describe • Explain • Apply • Maths 	<ul style="list-style-type: none"> • See cultural capital above 	<ul style="list-style-type: none"> • English • Maths • PE • D+T • ICT • History • Geography
Year 12 BIOLOGY: [The science of life] [From molecules to ecosystems]						

<u>Topics</u>	<u>Why we teach this</u>	<u>Links to last topic</u>	<u>Links to future topics</u>	<u>Key skills developed</u>	<u>Cultural capital opportunities</u>	<u>Links to whole school curriculum</u>
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 it's magic, explore in detail the environmental consequences human cause]						
1.6 Equilibria and Redox 3.2 Alkanes and Halogenoalkanes	So we can determine for 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 you 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: 2020-2021

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

<u>Topics</u>	<u>Why we teach this</u>	<u>Links to last topic</u>	<u>Links to future topics</u>	<u>Key skills developed</u>	<u>Cultural capital opportunities</u>	<u>Links to whole school curriculum</u>
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 chemical reactions and their applications.	AQA GCSE C1 C2 C3 C4	Unit 3 D1_Enzymes in action 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 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]

<u>Topics</u>	<u>Why we teach this</u>	<u>Links to last topic</u>	<u>Links to future topics</u>	<u>Key skills developed</u>	<u>Cultural capital opportunities</u>	<u>Links to whole school curriculum</u>
<u>Autumn 1</u> [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
<u>Autumn 2</u> [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
<u>Spring 1</u> [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
<u>Spring 2</u> [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
<u>Summer 1</u> [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.
<u>Summer 2</u> [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]

<u>Topics</u>	<u>Why we teach this</u>	<u>Links to last topic</u>	<u>Links to future topics</u>	<u>Key skills developed</u>	<u>Cultural capital opportunities</u>	<u>Links to whole school curriculum</u>
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]

<u>Topics</u>	<u>Why we teach this</u>	<u>Links to last topic</u>	<u>Links to future topics</u>	<u>Key skills developed</u>	<u>Cultural capital opportunities</u>	<u>Links to whole school curriculum</u>
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