Our Mission at The Burgate School & Sixth Form

We provide a broad and diverse curriculum with a creative approach to learning that inspires curiosity, encourages collaboration, builds resilience, and develops flexibility of thought.

Science at The Burgate

Our aim is to enable our students to develop an understanding of the world around us through the scientific method of objective, evidence-based questioning. We want our students to consider the implications of current and future scientific developments within our society and culture and reflect not only on their scientific impact but also the moral and social impacts that they may have. We want to inspire our students to become engaged scientifically as literate global citizens and help build the future we all want to live in.

Science Curriculum

Year	Topics		Enquiry Questions		Supportive Resources
7 Science	Autumn	Speed. Gravity. Particle model. Separating mixtures. Movement. Cells.	Where do forces come from? How do we measure speed? What are materials like inside? How do we move?	Is the force of gravity the same on the moon? How can we separate components of a mixture? What are we made of?	Carousel learning. BBC BITESIZE Kerboodle resources and textbook.
	Spring	Potential difference and resistance. Current. Acids and alkalis. Metals and non-metals. Interdependence. Universe.	Why do we sometimes get an electrical shock from a car door handle? What are chemical reactions? How do organisms interact within an ecosystem?	What is happening in a wire when a current flows? What are the patterns in reactions of acids? What substances are formed when metals and non-metals react with oxygen? How and why have ideas about the universe changed?	
	Summer	Energy costs. Energy transfers. Sound. Light. Variation. Human reproduction.	What is the connection between a lump of coal and a sandwich? How fast do sound and light travel? What is the link between amplitude and loudness? How do organisms vary?	Why are more efficient devices better? How do lenses correct short sight and long sight? How are new humans made?	
8 Science	Autumn	Contact forces. Pressure. Elements. Periodic table. Evolution. Inheritance.	Whay is there so little friction on some surfaces, like ice, but not others, like wood? What are atoms and elements? What is the theory of evolution by natural selection?	How does liquid pressure change with depth? How can we use the periodic table to predict element properties?	Carousel learning. BBC BITESIZE Kerboodle resources and textbook.

				What is the likelihood of you inheriting a characteristic?	
	Spring	Magnetism. Electromagnets. Types of reaction. Chemical energy. Breathing. Digestion.	How can you make a magnet strong enough to lift a car? What happens to the atoms in a chemical reaction? How does your body exchange gases with the environment?	Why does a compass point north? Why do chemical reactions transfer energy? How does the body break down food?	
	Summer	Work. Heating and cooling. Wave effects. Wave properties. Climate. Earth's resources. Respiration. Photosynthesis.	How are you transferring energy as you read this? What is ultrasound and how do we use it? What causes climate change? How does the body transfer energy from food by respiration?	How is energy transferred by particles? What damage does electromagnetic radiation do to the body? How can we conserve the Earth's resources? How do plants produce food by photosynthesis?	
9 Biology	Autumn	Cells	What is adaptation and why is it important?	How can we reduce the negative impact people have on ecosystems?	CGP GCSE revision guides. SENECA learning online. Freesciencelessons.co.uk online. BBC GCSE Bitesize Kerboodle online resources and textbooks.
	Spring	Biodiversity and Ecosystems. Cell structure and transport.	What is global warming and why does it matter?	How can Stem cells be used in human medicine?	
	Summer	Non-communicable disease. Respiration.	How does your lifestyle affect your risk of disease?	Why is cellular respiration important?	
10 Biology	Autumn	Cell Division. Organisation and the digestive system.	How do tissues work together?	What factors affect how an enzyme works?	CGP GCSE revision guides.

		Organising plants and animals.			SENECA learning online. Freesciencelessons.co.uk online. BBC GCSE Bitesize Kerboodle online resources and textbooks. Department pdf revision guide via Teams.
	Spring	Communicable Diseases. Preventing and Treating Disease.	How does the immune system work?	What are medicines and how do they work?	
	Summer	Photosynthesis.	What is photo synthesis and why is it important?	What factors limit the rate of photosynthesis?	
11 Biology	Autumn	The Human Nervous System. Hormonal Coordination.	Why are reflex actions so important for survival?	What is homeostasis and why is it so important?	CGP GCSE revision guides. SENECA learning online. Freesciencelessons.co.uk online. BBC GCSE Bitesize Kerboodle online resources and textbooks. Department pdf revision guide via Teams.
	Spring	Reproduction. Variation and Evolution.	How are characteristics passed on from parents to their offspring?	Why are mutations important?	
	Summer	Genetics and Evolution.	What is DNA?	Why is it important to analyse the genome of an organism?	
9 Chemistry	Autumn	The Earth's Atmosphere. Atomic Structure.	How is human activity affecting the Earth's atmosphere?	How can we use chemical tests to identify unknown substances?	CGP GCSE revision guides. SENECA learning online.

	Spring	The Periodic Table.	How was the periodic table developed over time?	How is atomic structure linked to the periodic table?	Freesciencelessons.co.uk online. BBC GCSE Bitesize Kerboodle online resources and textbooks.
	Summer	Chemical changes.	How can we predict the reactions of unfamiliar metals?	How can we predict products from given reactants?	
10 Chemistry	Autumn	Structure and Bonding.	What is a chemical compound?	How do atoms form positive and negative ions?	CGP GCSE revision guides. SENECA learning online. Freesciencelessons.co.uk online. BBC GCSE Bitesize Kerboodle online resources and textbooks. Department pdf revision guide via Teams.
	Spring	Electrolysis. Energy Changes.	What happens in electrolysis?	What types of substances can be electrolysed? How do you distinguish between exothermic and endothermic reactions?	
	Summer	Crude oils and Fuels. Chemical analysis.	What is crude oil made up of?	How can we identify examples of useful mixtures and formulations?	
11 Chemistry	Autumn	Chemical Calculations. Rates and equilibrium.	What is meant by relative atomic mass?	What is meant by the rate of a chemical reaction?	CGP GCSE revision guides. SENECA learning online. Freesciencelessons.co.uk online.
	Spring	The Earth's resources.	How can we distinguish between finite and renewable resources?	What is the difference between potable and pure water?	

	Summer	The Earth's resources.	What is a material life cycle assessment?	How do we evaluate ways of reducing the use of limited resources?	BBC GCSE Bitesize Kerboodle online resources and textbooks. Department pdf revision guide via Teams.
9 Physics	Autumn	Molecules and matter. Transfer by Heating.	How is density defined?	How does thermal conductivity affect the rate of energy transfer by conduction through a material?	CGP GCSE revision guides. SENECA learning online. Freesciencelessons.co.uk online. BBC GCSE Bitesize Kerboodle online resources and textbooks. Careers advice – Careers in Physics – Institute of Physics Engineering careers Medical Physics NHS Space Careers 1 Space Careers 2
	Spring	Conservation and Dissipation of energy.	How can energy be stored?	How can energy be transferred?	
	Summer	Electric Circuits.	What is electric current?	What is the difference between series and parallel circuits?	
10 Physics	Autumn	Motion.	How is speed calculated?	What is AC and DC?	CGP GCSE revision guides.

		Electricity in the home.	What is the difference between speed and velocity?		SENECA learning online. Freesciencelessons.co.uk online. BBC GCSE Bitesize Kerboodle online resources and textbooks. Department pdf revision guide via Teams. Careers advice – Careers in Physics – Institute of Physics Engineering careers Medical Physics NHS Space Careers 1 Space Careers 2
	Spring	Radioactivity. Forces in Balance.	What is a radioactive substance?	What is a vector quantity? What is a scalar quantity?	
	Summer	Wave properties	What are transverse and longitudinal waves?	What can waves be used for?	
11 Physics	Autumn	Energy Resources. Forces and Motion.	How are most energy demands met today?	How does the acceleration of an object depend on the size of the resultant force acting upon it?	CGP GCSE revision guides. SENECA learning online. Freesciencelessons.co.uk online. BBC GCSE Bitesize
	Spring	Electromagnetic waves. Electromagnetism.	What are the parts of the electromagnetic spectrum?	How do waves carry information?	
	Summer	Electromagnetism.	What are magnetic fields?	What is induced magnetism?	

					Kerboodle online resources and textbooks. Department pdf revision guide via Teams. Careers advice – Careers in Physics – Institute of Physics Engineering careers Medical Physics NHS Space Careers 1 Space Careers 2
12 Biology	Autumn	Cell structure Biological molecules Cell division Enzymes	What are cells made up of and how can we look inside them? How do enzymes make life happen?	Are the atoms in living organisms different to those in non-living things? How does DNA determine which proteins are made?	Department resources available through student Teams Online video channels: BioRach Mr Exham Khan Academy SENECA learning online Beyond the syllabus: CrashCourse Biology Professor Dave Explains NinjaNerd
	Spring	Biological membranes Exchange & transport Transport in animals Transport in plants	What does the gas exchange system of a fish and insect look like compared to your own?	Can you identify different structures inside an opened-up heart and describe their role in one cardiac cycle? Can you interpret an EEC?	
	Summer	Disease and the immune system Biodiversity Classification and evolution	How is the covid vaccine made and how does it work? On what levels can we consider biodiversity?	What makes organisms different? How do we know we descended with other great apes from a common ancestor?	

					https://www.ted.com/topics/biology
13 Biology	Autumn	Communication and homeostasis Excretion Animal and plant responses	How does our nervous system allow us to react to changes in the environment? What is the role of your liver and kidney?	How do plants grow towards what they need? How do plants control the loss of leaves or petals when no longer needed?	Department resources available through student Teams Online video channels: BioRach Mr Exham Khan Academy SENECA learning online Beyond the syllabus: CrashCourse Biology Professor Dave Explains NinjaNerd Careers advice https://www.conservation-careers.com/ https://www.healthcareers.nhs.uk/explore-roles https://www.rsb.org.uk/careers-and-cpd/careers/career-resources
	Spring	Photosynthesis Respiration Patterns of inheritance	How do plants transfer light energy into chemical energy? How is this chemical energy released in respiration to drive all exothermic reactions in a body?	Why are organisms in one species so different from each other? How is this inherited? Why are we more like our grandparents than our parents in some of our characteristics?	
	Summer	Cellular control Manipulating genomes Cloning and biotechnology Ecosystems and populations	What exactly happens when a cell differentiates? How can we create genetically modified organisms? What are the ethical implications of changing the DNA of an organism?	How are organisms interconnected? Why do we find certain species in certain habitats? What is sustainability?	

					https://www.thecompleteuniversityguide.co.uk/student-advice/careers/careers-with-a-biology-degree
12 Chemistry	Autumn	Foundations of Chemistry: Atomic Structure; The Mole; Acids and Bases; Covalent and Ionic Bonding Foundations of Organic Chemistry Meta Language for Organic Chemistry; Alkanes/Alkenes; Isomerism; Mechanisms	Does cooking temperature affect the concentration of ethanoic acid in vinegar, measured by acid-base titration? Calculating by experiment the water of crystallization present in organic solids? Can we define covalent and ionic bonding, or would a different model be more correct? How useful are full chemical equations, half-equations, and ionic equations?	How does polarity of solvent affect mechanism of nucleophilic substitution in haloalkanes? How does strength of carbon halide bond affect rate of reaction in nucleophilic substitution reactions of haloalkanes? Why is it so crucial in chemistry that different types of isomerism are defined with clarity? What do reaction mechanisms actually show?	Department Resources available through Teams. Supporting Notes and Questions • SENECA learning online • Royal Society of Chemistry – BestChoice (VLE) • SaveMyExams • Physics and Maths tutor (not just Physics and Maths). Video Channels: • Allery Chemistry • Crash Course Chemistry Going above and beyond the course:
	Spring	Shapes of molecules Intermolecular forces (dipole-dipole → H-bonding). Structure of the Periodic Table, Periodic trends, focus on Group 2/7.	What is the impact of the shape of molecules on their chemical properties? How has the development of the periodic table affected the thinking processes of chemists? Why do chemical and physical properties of elements become	What causes the difference in chemical and physical properties of the classes of alcohols? What is the effect of halogen electronegativity and atomic radius on bond angles in haloalkanes?	

		Reactions of alcohols and haloalkanes, environmental issues cf addition polymers. Introduction to synthetic routes.	reversed as the periodic table is transversed? If electrons are negative and repel, what holds a chemical bond together?	What is the relationship between metal ion charge density and thermal stability using thermal decomposition of metal carbonates?	• ISAAC Chemistry. • New Scientist • Royal Society of Chemistry Careers Advice: • Royal Society of Chemistry • Prospects • Milkround
	Summer	Differences between energy and enthalpy. Bond enthalpies, measurement of enthalpy change and calorimetry. Use of Hess' Law and the 1st Law of Thermodynamics. Maxwell-Boltzmann distribution and Introduction to Le Chatelier and Kc. Year 1 Organic Analysis – mass spectrometry, Infra-red spectroscopy.	How can we use redox titration to investigate copper content in coins? Use of Redox to determine percentage by mass of iron(II) in iron tablets. How does enthalpy of combustion in the alcohol homologous series vary with chemical properties? How can a Hess' Cycle be used to calculate a ΔH that is not possible to carry out in the real world.	What is the best way of defining enthalpy of neutralization bearing in mind the vast range of acids and bases? Which has a bigger impact as far as rate is concerned, changing the activation energy or increasing the temperature/concentration? How can infra-red spectroscopy be used to monitor the progress of a chemical reaction and is there a better way? How can products of organic synthesis be purified?	
13 Chemistry	Autumn	Mathematical implications of Le Chatelier, Kc/Kp. Bronsted/Lowry acids and base theory, pH of strong and weak acids and strong bases. Buffers,	How can 'wet chemistry' be used to identify ions in solution? How can experimental techniques be used to calculate Kc and Kp? Why can the mechanism for a reaction only be studied by	Why can acid/base titrations not be carried out using weak acids and bases? A study of the mechanisms involved in indicators. How can the pH curve be used to find the 'endpoint' of a chemical reaction?	Department Resources available through Teams. Supporting Notes and Questions

		biological and non-biological. Order of reaction and graphical methods. Advanced Energetics and Gibbs Free Energy and entropy.	examining the kinetics of the reaction?		• SENECA learning online • Royal Society of Chemistry – BestChoice (VLE) • SaveMyExams • Physics and Maths tutor (not just Physics and Maths). Video Channels: • Allery Chemistry • Crash Course Chemistry Going above and beyond the course: • ISAAC Chemistry. • New Scientist • Royal Society of Chemistry Careers Advice: • Royal Society of Chemistry • Prospects • Milkround
	Spring	Aromatic Chemistry, phenols and benzene. Carbonyl, carboxylic acids and their derivatives. Amino acids, amides and chirality. Further redox, electrode potentials, use of ΔG to predict extent of chemical reactions. Fuel cells	How can 'wet chemistry' be utilised to identify organic unknowns? Why are condensation polymers becoming a solution to use of plastics? Is the hydrogen economy every going to come to fruition?	What makes phenol significantly more reactive than benzene? How can we use Gibbs free energy to study the feasibility of chemical reactions? Are fuel cells a pipedream or are they becoming a reality?	
	Summer	Advances synthetic routes. Chromatography, NMR (proton and 13-C), Combined analysis techniques. Reading of Spectra. Transition metals, shapes of ions, ligand substitution and stereoisomerism.	Use of advanced redox techniques to investigate the copper content of brass screws. How can a redox reaction be fully utilised to calculate the proportion of Fe(II) present in lawn sand?	What are the limitations of advanced spectroscopic techniques? What is the difference between a transition element and a d-block element? Investigating the reaction between manganate(VII) ions and ethanedioate ions.	

12 Physics	Autumn	Foundations of Physics Forces, Work, Energy and Power Materials Science Newton's Laws and Momentum	How can we describe and explain the motion and interaction of objects in the universe?	How do engineers apply physics to characterise and analyse the use of materials?	Department resources and booklets available through Teams Supporting Notes and Questions Physicsandmathstutor Save my exams Video Resources Zphysics AlevelPhysicsonline Going Beyond the syllabus Isaac Physics Infinite Monkey Cage Veritasium New Scientist Careers advice – Careers in Physics – Institute of Physics Engineering careers Medical Physics NHS Space Careers 1 Space Careers 2
	Spring	Charge and Current Power and Resistance Progressive Waves	What actually is electricity? How can we use fundamental laws to describe the behaviour of charge in circuits? How can energy be transferred without transferring matter?	How are modern lives totally reliant on the application of waves and electrical current?	
	Summer	Electrical Circuits EM Waves Quantum Physics Interference and Harmonics	What is meant by a sensing circuit and how do you design one? How can we use Einstein's photoelectric equation?	What is a photon? Are electrons waves or particles? Are you a wave or a particle?	

13 Physics	Autumn	Thermal Physics and Ideal Gases Circular Motion and Oscillations Gravitational Fields Introduction to Astrophysics	How do you model the movement of particles in a gas? How does Kepler describe the orbit of planets?	How was Great British scientist Isaac Newton "Standing on the Shoulders of Giants"?	Department resources and booklets available through Teams Supporting Notes and Questions Physicsandmathstutor Save my exams Video Resources Zphysics AlevelPhysicsonline Going Beyond the syllabus Isaac Physics Infinite Monkey Cage Veritasium New Scientist Careers advice – Careers in Physics – Institute of Physics Engineering careers Medical Physics NHS Space Careers 1 Space Careers 2
	Spring	Electric Fields Capacitors Magnetic Fields Particle Physics Radioactivity Nuclear Physics	Can you compare electric and gravitational fields? How can we model radioactive decay? What is the Standard Model?	How can you combine electric and magnetic fields to make a mass spectrometer? How do we use Einstein's famous $E= mc^2$?	
	Summer	Medical Physics Cosmology	What is a medical physicist and why are they so important? How old is the universe?	How can you enter a career in medical physics? What is the Big Bang theory and what are it's implications?	