CURIOSITY COMPASSION COURAGE

Curriculum overview

Subject	Combined Science (Trilogy)	Year group	10
Vision statement:	At Landau Forte our curriculum exists to ensure all students regardless of background and ability have the opportunity to unlock their potential. We are committed to students being challenged from their previous key stage learning experiences. Our broad and balanced curriculum is ambitious, coherently planned and sequenced, and will provide the platform for preparing students with the foundations for examination success. Our Curriculum Intent has been informed by a wide variety of researchers and is steeped in evidence based research. Christine Counsell summarises the aspiration of our curriculum to empower all learners creating a pathway to success in university, their career and life: *'A curriculum exists to change the pupil, to give the pupil new power. One acid test for a curriculum is whether it enables even lower attaining or disadvantaged pupils to clamber into the discourse and practices of educated people, so that they gain powers of the powerful.'* As well as excellent academic success we aim to ensure our students leave us as polite and well-rounded young adults. Our new core values of Compassion, Courage and Curiosity are currently being embedded throughout our curriculum offer to ensure we continue to meet our social, emotional, spiritual and moral obligations.		
Curriculum intent:	In line with the Academy's vision to enhance students' understanding of the world by ensuring an educational journey guided with care and compassion the Science department at Landau Forte Academy QEMS aim to deliver a curriculum that not only develops students' knowledge and understanding of the subject but inspires them to succeed far beyond their education at the academy. The science curriculum aims to be; ○ Aspirational ○ Ambitious ○ Coherent both in planning and sequence ○ Adapted successfully to suit all needs and abilities ○ Broad - covering not only aspects of the subject but how this can be taken into the outside world In delivering the knowledge based curriculum students will be able to not only achieve the best they can academically but also link theory to reason, understand why they learn about specific concepts, grasp how this fits into the world of careers and ultimately develop the skills and reasoning needed to become well rounded individuals. The curriculum aims to give students a range of opportunities within the classroom and beyond allowing them to become confident and articulate in their scientific ideas. Consistently high expectations of both students and teaching staff ensures that every individual in Science has access to the highest quality of teaching and learning possible and working with key stakeholders ensures that our students have every opportunity to achieve. In summary the Science curriculum is developed and tailored for each specific year group taking into account the demographic of our students. The intention of which is to allow students to think deeper and use knowledge based skills within their learning both in science and throughout their lives.		

Threshold Concepts (TCs):	*Biology* 1. Cell biology 2. Organisation 3. Infection and response 4. Bioenergetics 5. Homeostasis and response (yr 11) 6. Inheritance, variation and evolution (yr 11) 7. Ecology (yr 11) *Chemistry* 1. Atomic structure and periodic table 2. Bonding, structure and properties of matter 3. Quantitative chemistry 4. Chemical changes 5. Energy changes 6. Rate and extent of chemical change (yr 11) 7. Organic chemistry (yr 11) 8. Chemical analysis (yr 11) 9. Chemistry of the atmosphere (yr 11) 10. Using resources (yr 11) *Physics* 1. Energy 2. Electricity 3. Particle model of matter 4. Atomic structure 5. Forces (yr 11) 6. Waves (yr 11) 7. Magnetism and electromagnetism (yr 11) 8. Space (yr 11) (separate physics only)
KS2 National Curriculum summary:	The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and

classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.

Pupils should read, spell and pronounce scientific vocabulary correctly.

Working scientifically

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations
- identifying scientific evidence that has been used to support or refute ideas or arguments

Topics covered:

Animals Including Humans, Everyday Materials (Properties and Changes of Materials), Living Things and their Habitats, Light, Forces and Magnets, Electricity, Earth and Space, Evolution.

Learner skills:	Critical thinking	Organisation	Collaboration	Adaptability	Oracy	Self-quizzing
						

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	Term 1 Aug-Oct	Term 2 Nov-Dec	Term 3 Jan-Feb	Term 4 Mar-Apr	Term 5 Apr-May	Term 6 Jun-Jul
The Big Question	**How can Science be used to solve the problems of the future?**					
Big picture questions:	**Biology:** What is a cell? Why are animal and plant cells different? **Chemistry:** What is an atom and why is it different to a compound?	**Physics:** What is energy and why can it not be destroyed? **Biology:** What are organ systems and how does my body keep me alive?	**Chemistry:** What's the difference between sand, salt and water on an atomic level? **Biology:** What makes people ill and how do they get better?	**Physics:** Why does electricity work and how does a bulb light up? **Chemistry:** Why does it matter how much baking powder I add to the cake mixture?	**Physics:** How are particles arranged in substances and what happens when substances change state? **Biology:** What is the relationship between photosynthesis and respiration?	**Chemistry:** Why are some metals more reactive then others? **Chemistry:** Why do some reactions get hotter and others get colder?
Content (Linked to TCs):	Biology: • Prokaryotic and Eukaryotic Cells • Comparing of cells • Order of magnitude calculations • Microscopes, magnification and resolution • Using the microscope and magnification equation • Viewing animal cells under the microscope and calculating magnification • Specialised cells • Diffusion	Physics: • Energy transfers • The kinetic energy store • The gravitational potential store • Conservation of energy • The elastic potential store • Power • Efficiency and reducing unwanted energy transfers • Specific heat capacity • Specific heat capacity required practical • Insulating material required practical	Chemistry: • Ionic bonding introduction • Further ionic bonding • Properties of ionic compounds • Covalent bonding • Simple covalent molecules • The giant covalent structures • Giant covalent structures: Graphene • Polymers • Metallic bonding	Physics: • Drawing electrical circuits • Charge and current • Potential difference • Electrical resistance • Resistance of a wire • Series circuits • Parallel circuits • Series and parallel circuits • Properties of resistors • Filament lamps • Diodes • Light dependent resistors • Thermistors	Physics: • Particle models • Density of solids • Density required practical • Density of liquids • Internal energy • Heating and cooling substances • Latent heat • Multi-Step energy calculations • Gas pressure Biology: • Photosynthesis • Limiting factors of photosynthesis	Chemistry: • Redox • Investigating the reactivity of metals • Displacement reactions of metals • Redox • Acid base reactions • Observations from acid base reactions • Acid base ionic equations • Making salts • Acids, alkalis and the pH scale • Strong and weak acids • Titrations

	• Exchange surfaces and surface area to volume ratio • Osmosis • Active transport • Cell cycle and mitosis • Aseptic techniques • Effectiveness of disinfectants • Stem cells and the use of stem cells Chemistry: • Atoms, elements and compounds • Chemical formulae and conservation of mass • Mixtures, filtration and crystallisation • Separation by distillation • Separation by chromatography • Atomic structure • Development of the atomic model • Isotopes • Electron Configuration	• Non-Renewable energy resources • Renewable energy resources Biology: • Food tests • Digestive enzymes • Digestion • Absorption • Investigating enzymes • pH and enzymes • The lungs • Blood and blood vessels • The heart • Heart rate • Heart disease • Non-Communicable disease • Cancer • Plant tissue • Plant roots • Transport in plants • Investigating transpiration •	• Solids, liquids and gases • Nanoparticles (GCSE Chemistry only) Biology: • Infectious disease • Viral and bacterial disease • Fungal and protist disease • Immunity • Vaccines • Antibiotics • Maths skills • Testing drugs • Monoclonal antibodies • Plant diseases and deficiencies	• Review of electrical circuits • Domestic electricity • Electrical power • The national grid • Domestic electricity review • Static electricity • Electric fields Chemistry: • Relative formula mass • Moles and Avogadro's constant (HT only) • Balancing equations using moles (HT only) • Reacting masses (HT only) • Reacting masses and yield (GCSE Chemistry) • Atom economy • Concentration • Titration calculations • Limiting reactants • Gas Volumes • Review •	• Manipulating factors of photosynthesis HT • Review photosynthesis • Respiration • Anaerobic respiration • Consequences of anaerobic respiration • Metabolism	• Processing titration results • Electrolysis of molten compounds • Extraction of aluminium • Electrolysis of solutions • Developing an electrolysis hypothesis • Electrolysis half equations • Reactivity and acid base reactions Chemistry: • Exothermic and endothermic reactions • Required Practical: Temperature change • Energy level diagrams • Calculating bond energies • Fuel cells (Triple)

	and the Periodic Table • Periodic Table development • Why elements react • Group 1 • Group 7 • Group 7 Displacement • Comparing the reactivity's of Group 1 and 7 elements • Displacement reactions: Ionic equations • Transition elements					
Vocabulary Instruction:	Prokaryotic Eukaryotic Microscopes Diffusion Exchange Osmosis Active transport Cell cycle and mitosis Atoms Elements Compounds Filtration Crystallisation Distillation Chromatography Isotopes Displacement	Digestive Digestion Absorption Enzymes pH Lungs Blood Heart Non-Communicable disease Cancer Roots Transpiration Ionic Covalent Simple covalent Giant covalent	Infectious Viral Bacterial Fungal Protist Immunity Vaccines Antibiotics Monoclonal Electrical Charge Current Potential Resistance Series Parallel Resistors	Avogadro's Yield Atom economy Concentration Titration Limiting reactants Particle models Density Internal energy Heating Cooling Latent heat Gas pressure	Photosynthesis Respiration Anaerobic Metabolism Synoptic Redox reactivity of metals Displacement Acid Base ionic equations Strong and weak acids Titrations Electrolysis Extraction of aluminium	Exothermic endothermic Temperature Bond energies Fuel cells

	Kinetic Gravitational Elastic Power Efficiency Specific heat capacity Insulating Non-Renewable energy Renewable energy	Graphene Polymers Metallic	Diodes The national grid Static			
Assessment:	Key learning task for each topic	Key learning task for each topic	Key learning task for each topic	Key learning task for each topic	Key learning task for each topic	Key learning task for each topic
Key/Historical misconceptions in this unit:	**Misconception:** All cells are the same. **Misconception:** Elements and compound are the same **Misconception:** Energy can be created and destroyed.	**Misconception:** Our heart, lungs and brain are all we need to survive. **Misconception:** Diamond and graphite are made of completely different things.	**Misconception:** Vaccines contain the live disease. **Misconception:** Electricity only comes out of a plug	**Misconception:** The more chemical you add, the better the reaction **Misconception:** Boiling and evaporating are the same	**Misconception:** Plants don't respire **Misconception:** Bases and alkalis are different	**Misconception:** All reactions get hot
Sequencing:	We have chosen this way to sequence the year 10 curriculum based on several factors. This sequence is based on building up the fundamental concepts taught in KS3 (year 7-9) to extend the students to GCSE and allows opportunities for retrieval, interleaving and spaced practice. The retrieval is a regular element in all lessons and focuses not just on last lesson but on last week, last month and last year. The interleaving and spaced practice is embed in the covering of concepts in a spiral motion, moving from Biology to Chemistry to Physics. The common aspects of the sciences are not taught in one block but are spaced out over the two years to maximise student learning.					
Values	**This scheme of work promotes the school values of Compassion, Curiosity and Courage by:** **Compassion – Acceptance of differing scientific models. Support of peers during feedback process'** **Curiosity – Asking scientific questions and focus on scientific investigations** **Courage – Review of prior learning and acting on feedback to bridge gaps within knowledge**					

National Curriculum plus:	At GCSE, we offer the AQA specification which covers the National Curriculum in its entirety. We do, however, offer additional experiences such as a visit from Severn Trent to share their part in the cleaning of potable water as well as support provided through the wider school with reference to science careers.