CURIOSITY COMPASSION COURAGE

Curriculum overview

Subject	Combined Science (Trilogy & Separate)	Year group	11
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* 6. *Inheritance, Variation and Evolution* 7. *Ecology* *Chemistry* 1. *Atomic Structure and the Periodic Table* 2. *Bonding, Structure, and the Properties of Matter* 3. *Quantitative Chemistry* 4. *Chemical Changes* 5. *Energy Changes* 6. *The Rate and Extent of Chemical Change* 7. *Organic Chemistry* 8. *Chemical Analysis* 9. *Chemistry of the Atmosphere* 10. *Using Resources* *Physics* 1. *Energy* 2. *Electricity* 3. *Particle Model of Matter* 4. *Atomic structure* 5. *Forces* 6. *Waves* 7. *Magnetism and Electromagnetism*
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:	**Physics:** What is energy and why can it not be destroyed? **Physics:** Why does electricity work and how does a bulb light up? **Physics:** How are particles arranged in substances and what happens when substances change state?	**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? **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? **Chemistry:** Why does it matter how much baking powder I add to the cake mixture?	**Biology:** What makes people ill and how do they get better?	**Biology:** What is the relationship between photosynthesis and respiration? **Chemistry:** Why do some reactions get hotter and others get colder?		
Content (Linked to TCs): *Triple Science students will follow the topics listed in a slightly different order (following there timetable). The additional Triple Science content is shown in red.*	Physics Paper 1 Topic 1 • Energy changes in systems • Power Topic 2 • Standard circuit diagram symbols • Electrical charge and current • Current, resistance and	Chemistry Paper 1 Topic 1 • Ionic equations • Mixtures • Transition Metals Topic 2 • Polymers • States of Matter (covered in Topic 8) • Alloys Topic 3 • Uncertainty	Biology paper 1 (cont.) Topic 3 • Viral diseases example – Measles and Tobacco mosaic virus • Fungal disease • Vaccination • Antibiotics and pain killers • Discovery and development of drugs Topic 4	Biology Paper 2 (cont.) Topic 7 Ecology RP7 – Measure population size (quadrats) Decomposition • RP10 – rate of decay of milk • Impact of environmental change • Trophic levels Biomass • Food production	Exam Prep	Exam Prep

	potential difference • Resistors • Series and parallel circuits • Domestic uses and safety • Mains electricity • Power • Energy transfers in everyday appliances • National Grid Topic 3 • Density of materials • Changes of state • Internal energy • Temperature changes in a system and specific heat capacity • Changes of state and specific latent heat • Particle motion in gases Topic 5 • Work done • Power • Elasticity • Moments, levers and gears	• Balancing by moles • Limiting reagents • % yield and atom economy • Concentration (mol dm^{-3}) • Gas volumes Topic 4 • Metal reactivity series • Transition metals • Metal extraction • Oxidation • Acids and alkalis • RP8 Preparation of a pure, dry salt • Electrolysis • RP9/RP3 – Electrolysis • Titrations + RP2 Biology Paper 1 Topic 1 • Xylem and phloem specialisation • STEM Cells – Cell differentiation • Rate of diffusion • Surface area to volume ratio • Gills	• Photosynthesis • RP5 – Pond weed photosynthesis • Respiration Biology Paper 2 Topic 5 • Homeostasis • RP6 – Factors that affect human reaction time • Hormonal coordination in humans (CB7) • Mainlining temperature, water and nitrogen levels • Plant hormones • RP8 – effect of light and gravity on seedlings • Uses of plant hormones Topic 6 • Inherited disorders • GM Crops • Classification • Advantages and disadvantages of sexual and asexual reproduction • Cloning • Speciation	Chemistry Paper 2 Topic 6 Reversible reactions Dynamic equilibria Le Chatelier Principles • Cells and batteries Fuel cells Topic 7 • Amino acids • DNA Topic 8 Formulation Pure substances • States of matter (Topic 2) Chromatography • RP12/RP6 – Separating coloured substances • Gas tests recap • Flame tests and test for ions (RP7) Topic 9 Global dimming Topic 10 Life cycle assessments • Potable water RP13/RP8 – Purification of water • Water waste • Alternative methods for extracting metals Corrosion		

	• Pressure in fluids • Atmospheric pressure Topic 6 • Wave period • RP21/RP10 Absorption of IR (Leslie Cube) • Units for radiation • Emission and absorption of infrared radiation • Perfect black bodies and radiation • (RP2 – Thermal insulators) Topic 7 • Density • Particle Model of the atom • Motors • Loudspeakers • Induced potential • Uses of generator effect • Microphones • Transformers	• Culture and microorganisms Topic 2 • Bile • The heart and blood vessels • Blood • Cancer – malignant and benign • Plant tissues • Plant organ systems		• Ceramics and composites Alloys Haber Process • Production and use of NPK		

Vocabulary Instruction:	Power Charge Current Current Resistance Potential difference Resistors Series Parallel National Grid Density Specific heat capacity Specific latent heat Elasticity Pressure Emission Absorption	Ionic Transition Metals Polymers Alloys Uncertainty Limiting reagents % yield and atom economy Concentration Acids and alkalis Electrolysis Xylem and phloem STEM Rate of diffusion Surface area to volume ratio Bile Heart Blood	Viral Measles Fungal Vaccination Antibiotics Photosynthesis Respiration Homeostasis Plant hormones Cloning Speciation	Ecology population size Decomposition Biomass Reversible reactions Dynamic equilibria Le Chatelier Fuel cells Formulation Pure Chromatography Global dimming Life cycle assessments Purification Corrosion Alloys Haber Process NPK		
Assessment:	• Regular - end of topic assessment and feedback opportunities	• Regular - end of topic assessment and feedback opportunities • PPE Exam and QLA	• Regular - end of topic assessment and feedback opportunities • PPE Exam and QLA	• Regular - end of topic assessment and feedback opportunities	**Official GCSE Examinations**	**Official GCSE Examinations**
Key/Historical misconceptions in this unit:	**Misconception:** Energy can be created and destroyed. **Misconception:** Electricity only comes out of a plug	**Misconception:** Our heart, lungs and brain are all we need to survive. **Misconception:** Diamond and graphite are made of completely different things. **Misconception:** All cells are the same.	**Misconception:** Vaccines contain the live disease. **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		

		Misconception: Elements and compound are the same				
Sequencing:	We have chosen this way to sequence the year 10 curriculum based on several factors. The specification has provided us with a route through that we felt strongly we wanted to follow. 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 and retrieval.					
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.					