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 (year 10)* 2. *Organisation (year 10)* 3. *Infection and Response (year 10)* 4. *Bioenergetics (year 10)* 5. *Homeostasis and Response* 6. *Inheritance, Variation and Evolution* 7. *Ecology* *Chemistry* 1. *Atomic Structure and the Periodic Table (year 10)* 2. *Bonding, Structure, and the Properties of Matter (year 10)* 3. *Quantitative Chemistry (year 10)* 4. *Chemical Changes (year 10)* 5. *Energy Changes (year 10)* 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 (year 10)* 2. *Electricity (year 10)* 3. *Particle Model of Matter (year 10)* 4. *Atomic structure (year 10)* 5. *Forces* 6. *Waves* 7. *Magnetism and Electromagnetism* 8. *Space (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:	Physics: How are objects affected by forces? Physics: What are the applications of waves? Physics: How are magnets and motors linked?	Chemistry: Can we speed up and slow down reactions? What is organic chemistry? Was there always oxygen in the atmosphere?	Chemistry: what is sustainability? Biology: How does my body keep me alive?	Chemistry: Why do some reactions get hotter and others get colder?		

Content (Linked to TCs):	Forces
	• scalar and vector quantities
	• contact and non contact forces
	• gravity
	• resultant forces
	• Work done and energy transfer
	• Forces and elasticity
	• Motion
	• Distance and displacement
	• Speed and velocity
	• Distance time relationship
	• Acceleration
	• Newton's 1st law
	• Newton's 2nd law
	• Newton's 3rd law
	• Stopping distances
	• Reaction times
	• Momentum
	Waves
	• Transverse and longitudinal waves
	• Properties of waves
		Rate and extent of chemical change
		• Calculating rate
		• Factors affecting rate
		• Collision theory and activation energy
		• Catalysts
		• Reversible reactions
		• Energy changes and reversible reactions
		• Equilibrium
		• Effects of changing conditions on equilibrium
		  ○ Concentration
		  ○ Temperature
		  ○ Pressure
		Organic chemistry
		• Crude oil, hydrocarbons and alkanes
		• Fractional distillation and petrochemicals
		• Properties of hydrocarbons
		• Cracking and alkenes
		Chemical analysis
			Using Resources
			• Potable water
			• Resources and sustainability
			• Alternate methods of extracting metals
			• Life cycle assessments
			• Ways of reducing the use of resources
			
			Biology
			Homeostasis and response
			• Homeostasis
			• Nervous system
			• Endocrine system
			• Control of blood glucose concentration
			• Hormones in human reproduction
			• Contraception
			• Hormones to treat infertility
			• Feedback systems
				Inheritance, variation and evolution
				• Reproduction
				• Meiosis
				• DNA and the genome
				• Genetic inheritance
				• Inherited disorders
				• Sex determination
				• Variation
				• Evolution
				• Selective breeding
				• Genetic engineering
				• Evidence for evolution
				• Extinction
				• Resistant bacteria
				• Classification
				
				Ecology
				• Communities, abiotic and biotic factors
				• Adaptations
				• Levels of organisation
				• Material cycles
					Exam Prep	Exam Prep

	• EM waves
	• Properties of EM waves
	• Uses and applications of EM waves
	Magnetism and electromagnetism
	• Magnets
	• Magnetic fields
	• Electromagnetism
	• Flemings left hand rule
	• Electric motors
	Space (separate physics only)
	• Life cycle of stars
	• Solar system and orbits
	• Red-shift and the big bang
		• Pure substances
		• Formulations
		• Chromatography
		• Tests for gases
		  ○ Hydrogen
		  ○ Oxygen
		  ○ Carbon dioxide
		  ○ Chlorine
		Chemistry of the atmosphere
		• Gases in the atmosphere
		• Early atmosphere
		• Changes to the atmosphere
		• Greenhouse gases and climate change
		• Atmospheric pollutants from fuels
				• Biodiversity, waste management and land use
				• Deforestation and global warming
				• Maintaining biodiversity		

Vocabulary Instruction:	Scalar Vector Force Acceleration Momentum Transverse Longitudinal Amplitude Frequency Wavelength Magnetic field Electromagnet Motor	Reversible reactions Dynamic equilibria Le Chatelier Fuel cells Formulation Pure Chromatography Global dimming Life cycle assessments Purification Corrosion Alloys Haber Process NPK	Photosynthesis Respiration Homeostasis Cloning Speciation	Ecology population size Decomposition Biomass		

Assessment:	Key assessment task for every topic	Key assessment task for every topic	Key assessment task for every topic	Key assessment task for every topic	**Official GCSE Examinations**	**Official GCSE Examinations**
Key/Historical misconceptions in this unit:	**That forces are always balanced** **Newton's third law applies to one object** **That sound and light are the same type of wave** **Motors use only electricity to turn**	**That a 'chunk' of reactant will react faster than a powder of the same mass** **Corrosion just means rusting** **Petrol is the same as oil** **The atmosphere has never changed**	**Photosynthesis needs oxygen** **Respiration is breathing**	**Meiosis and mitosis are the same process** **Selective breeding is always positive** **Bacteria have become 'immune' to antibiotics through natural selection**		
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 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.					