CURIOSITY COMPASSION COURAGE

Curriculum overview

Subject	Physics	Year group	13
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*		

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Threshold Concepts (TCs):	*Further Mechanics* *Electric and Magnetic Fields* *Nuclear and particle physics* *Thermodynamics* *Gravitational fields* *Nuclear radiation* *Space* *Oscillations*					
KS4 specification summary:	Students learn about a variety of topics and concepts at KS4 (listed below), which form the foundation for the A-Level Physics teaching. • Energy • Electricity • Particle model of matter • Atomic structure • Forces • Waves • Magnetism and electromagnetism • Space					
Learner skills:	Critical thinking  	Organisation  	Collaboration  	Adaptability  	Oracy  	Self-quizzing 
	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 we describe, model and explain everything in existence, from the tiniest subatomic particles to the birth and death of the universe?					
Big picture questions:	<u>Topic 7</u> How can we describe and use electric fields, and how are they similar to other fields in physics?	<u>Topic 8</u> What are the smallest pieces of matter and how do we know they exist? <u>Topic 9</u>	<u>Topic 12</u> How can gravity be described and how does it affect objects in space? <u>Topic 11</u>	<u>Topic 10</u> How do we know so much about our universe when it's all so far away? <u>Topic 13</u>	Revision Exams – Paper 1	Exams – Paper 2 & 3

		What is temperature and how does it affect the properties of materials?	What is radioactive decay and how can we predict it if it's a completely random process?	How can we describe the motion of oscillating objects, such as pendulums?		
Content (Linked to TCs):	Topic 7: 121 – 146 In this topic students will learn about the nature of electric fields, the similarities and differences to gravitational fields, and model the effects of electrical fields in everyday situations. Students will also learn about the interactions between electric and magnetic fields.	Topic 8: 147 – 160 In this topic students will learn about subatomic particles and their interactions, as well as the known rules and limitations of our knowledge in this field of study. Topic 9: 170 – 177 In this topic students will learn about the relationship between materials, temperature and energy, modelling this mathematically to gain an understanding of the interactions of pressure, temperature and volume in three dimensions.	Topic 12: 114 – 120 In this topic students will learn about the nature of the force of gravity, modelling gravitational fields and interactions. Topic 11: 161 – 169 In this topic students will learn about the phenomena of radioactive decay, and apply more complex mathematical modelling to understand the nature of this process.	Topic 10: 178 – 191 In this topic students will learn about the internal workings of stars and their life cycles. Students will also model the effects of near-light speed motion, such as the effects of time-dilation on particles entering the Earth's atmosphere. Topic 13: 192 – 202 In this topic students will learn about simple harmonic motion, and model how this phenomena applies to a wide variety of situations that have already been studied, such as circular motion, pendulums, electricity, waves, particles and light.	Revision Exams	Exams
Key vocabulary:	Topic 7: Field, electric field strength, capacitance, time constant, magnetic field, magnetic flux density, magnetic flux, Faraday's law, electromagnetic	Topic 8: Isotopes, unified atomic mass unit, Topic 9: Internal energy, temperature, specific heat capacity, heating, specific latent heat of	Topic 12: Gravitational field, gravitational field strength, inverse square law, weightlessness Topic 11: Half-life ,	Topic 10: Light year, standard candle, nuclear fusion, Topic 13: Amplitude, period, frequency, simple harmonic motion, free oscillation, damped	Revision Exams	Exams

	induction, root mean square	fusion, specific latent heat of vaporisation, absolute zero, Pascal, Boyle's Law, ideal gas,		oscillation , forced oscillation, resonance		
Assessment:	Retrieval tests throughout Key learning task for each topic	Retrieval tests throughout Key learning task for each topic	Retrieval tests throughout Key learning task for each topic	Retrieval tests throughout Key learning task for each topic	Exams – Paper 1	Exams – Paper 2 & 3
Key/Historical misconceptions in this unit:	• Clarity on the similarities and differences between gravitational, magnetic and electric fields, both qualitatively and quantitatively.	• Understanding the difference between the particle and wave nature of radiation, as well as types of radiation that cannot be detected.	• Understanding the difference between closed and open systems and how to apply the principle of conservation of energy to both situations. • Luminosity and distance of stars are not directly correlated. • Confusion around practical and theoretical applications of the Lorentz time-dilation effect.	• That oscillations are more than just springs, pendulums and orbits, and can in fact be applied in many situations, as long as the mathematical relationships are carefully constructed. Revision: • That topics can be considered stand-alone; there are many synoptic questions.	Revision Exams	Exams
Sequencing:	We have chosen to sequence the year 13 curriculum like this because we have built a foundation of knowledge in topics 2-6 in year 12. This is built upon in topic 12 and 7, which are similar field law areas of physics with a similar mathematical approach to modelling and also need to be compared in the exams. In topics 8 & 11, we continue to build on the previous topics to learn about inter-related subatomic structures, radiation and particle physics. In topics 9 & 10 we again build on the previous topics to learn about thermodynamics and the linked effects of black body radiation in space and cosmology. Topic 13 is a highly complex topic, requiring a thorough grounding in all areas of physics taught so far, as oscillations occur throughout physics and these models can be applied to almost all the topics studied so far in a synoptic fashion. This also brings us towards the main aspect of revision in the latter part of the year, where interlinking of discrete topics to approach synoptic questions is an essential exam skill. Topic 1 is woven throughout the course, covering all aspects of practical physics and the development and application of scientific process throughout history.					