



CURIOSITY

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Curriculum overview







Subject	Applied Science	Year group	12
<p>Vision statement:</p>	<p>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.</p> <p>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:</p> <p><i>'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.'</i></p> <p>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.</p>		
<p>Curriculum intent:</p>	<p><i>Must include school values (3Cs)</i></p> <p><i>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.</i></p> <p><i>The science curriculum aims to be;</i></p> <ul style="list-style-type: none"> ○ <i>Aspirational</i> ○ <i>Ambitious</i> ○ <i>Coherent both in planning and sequence</i> ○ <i>Adapted successfully to suit all needs and abilities</i> ○ <i>Broad - covering not only aspects of the subject but how this can be taken into the outside world</i> <p><i>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.</i></p> <p><i>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</i></p>		



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<p>Threshold Concepts (TCs):</p>	<p><u>Unit 1: Principles of Science</u></p> <p><u>Chemistry:</u> A Periodicity and properties of elements A1 Structure and bonding in applications in science A2 Production and uses of substances in relation to properties</p> <p><u>Biology:</u> B Structure and functions of cells and tissues B1 Cell structure and function B2 Cell specialisation B3 Tissue structure and function</p> <p><u>Physics:</u> C Waves in communication C1 Working with waves C2 Waves in communication C3 Use of electromagnetic waves in communication</p> <p><u>Unit 2 Practical Scientific Procedures and Techniques</u></p> <p>A: Undertake titration and colourimetry to determine the concentration of solutions B: Undertake calorimetry to study cooling curves C: Undertake chromatographic techniques to identify components in mixtures D: Review personal development of scientific skills for laboratory work</p> <p><u>Unit 3: Science Investigation Skills</u></p>					
<p>KS4 specification summary:</p>	<p>The KS4 science curriculum ensure students have the knowledge to enable them to develop curiosity about the natural world, insight into working scientifically, and appreciation of the relevance of science to their everyday lives. This allows students to not only develop scientific knowledge and conceptual understanding through the specific disciplines of biology but also develop understanding of the nature, processes and methods of science, through different types of scientific enquiry that help them to answer scientific questions about the world around them.</p>					
<p>Learner skills:</p>	<p>Critical thinking</p>  <p>CRITICAL THINKING</p>	<p>Organisation</p>  <p>ORGANISATION</p>	<p>Collaboration</p>  <p>COLLABORATION</p>	<p>Adaptability</p>  <p>ADAPTABILITY</p>	<p>Oracy</p>  <p>ORACY</p>	<p>Self-quizzing</p>  <p>SELF QUIZZING</p>



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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	Unit 1: What are the key principles of science? Unit 2: How can I apply the science I have learnt? Unit 3: How can I investigate key scientific concepts?					
Big picture questions:	What are the key principles in chemistry? What are the key principles in biology?	What are the key principles in physics?	What is colorimetry and how can I use it to determine the concentration of a solution?	What is a cooling curve and how can I use this to determine melting point?	What is chromatography and how can this be linked to organic compounds?	What skills would I need to work in a laboratory?
<ul style="list-style-type: none"> Content (Linked to TCs): 	Unit 1: Principles and applications of science Chemistry A: Structure and bonding in applications in science <ul style="list-style-type: none"> Electronic structure Ionic bonding Covalent bonding Metallic bonding Intermolecular forces Quantitative chemistry A2: Production and uses of substances in relation to properties <ul style="list-style-type: none"> The periodic table Physical properties of elements 	Unit 1: scientific principles Physics C1 Working with waves <ul style="list-style-type: none"> Describing waves Graphical representation of wave features Transverse and longitudinal waves Displacement, coherence, path difference, phase difference and superposition of waves Industrial application of diffraction gratings 	Unit 2: Assignment A: <ul style="list-style-type: none"> Undertake titration and colorimetry to determine the concentration of solutions Use of pH meters and probe Use of balances and weighing Safe use of volumetric glassware Accurate determination of the end-point of titrations Selection and use of a colorimeter or visible spectrometer 	Unit 2: Assignment B: <ul style="list-style-type: none"> Undertake calorimetry to study cooling curves Explain the relationship between temperature and heat energy. Utilise types of thermometer and how they are used to gain accurate readings Identify rate of cooling from the gradient of the tangent to the cooling curve. 	Unit 2: Assignment C: <ul style="list-style-type: none"> Undertake chromatographic techniques to identify components in mixtures Principles of paper chromatography. Principles of thin-layer chromatography (TLC) Use of capillary tubes to apply mixtures to paper or TLC plates. Choice of developing solvent and vessel. 	Unit 2: Assignment D: Review personal development of scientific skills for laboratory work Unit 3: Science investigation skills A Planning a scientific investigation A1 Developing a hypothesis for an investigation A2 Selection of appropriate equipment, techniques and standard procedures



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- Chemical properties of elements

Biology

B Cell structure and function

- Cell theory
- Prokaryotic and eukaryotic cells
- Microscopes
- Bacterial cells
- Magnification

B2 Cell specialisation

- Cell specialisation in terms of structure and function

B3 Tissue structure and function

- Structure and function of epithelial tissue
- Endothelial tissue
- Muscular tissue
- Nervous tissue

- Wave equations
- Resonance
- Musical instruments

C2 Waves in communication

- Fibre optics
- Applications of fibre optics in medicine
- Fibre optics in communication

C3 Use of electromagnetic waves in communication

- Speed of em waves
- Inverse square law
- Frequency of EM waves
- Applications of EM waves in communication

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- Determination of melting point from the shape of a curve for a substance freezing.

Assignment C:

- Undertake chromatographic techniques to identify components in mixtures
- Principles of paper chromatography.
- Principles of thin-layer chromatography (TLC)
- Use of capillary tubes to apply mixtures to paper or TLC plates.
- Choice of developing solvent and vessel.
- Preparative methods for samples
- Separation of components of a mixture, to include plant pigments extracted from leaves/herbs with propanone.

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- Preparative methods for samples
- Separation of components of a mixture, to include plant pigments extracted from leaves/herbs with propanone.

Assignment D:

Review personal development of scientific skills for laboratory work

A3 Health and safety associated with the investigation
A4 variables in the investigation
A5 method for data collection and analysis





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<p>Key vocabulary:</p>	<p>Chemistry electronic structure, electrostatic, covalent bonding, dative covalent, intermolecular forces, van der Waals, dipole-dipole, hydrogen bonding, s block, p block, d block, ionisation energy, electron affinity, oxidation, reduction</p> <p>Biology Ultrastructure, Prokaryote, Eukaryotic, Organelles, gram-positive and gram-negative, magnification, cell specialisation, epithelial tissue, chronic obstructive pulmonary disease, endothelial tissue, atherosclerosis, myelination, neurotransmitters</p>	<p>Biology Ultrastructure, Prokaryote, Eukaryotic, Organelles, gram-positive and gram-negative, magnification, cell specialisation, epithelial tissue, chronic obstructive pulmonary disease, endothelial tissue, atherosclerosis, myelination, neurotransmitters</p> <p>Physics Speed, wavelength, frequency, amplitude, oscillation, transverse, longitudinal, displacement, coherence, path difference, phase difference, superposition, diffraction grating, inverse square law, critical angles, refractive index, total internal reflection</p>	<p>Titration Acid Base Standard solution Indicator Colorimeter Concentration pH volumetric</p>	<p>Cooling curve Thermometer Gradient Tangent Melting point Pure Impure Calorimetry</p>	<p>Chromatography Thin layer chromatography Solvent Capillary Rf value Stationary phase Mobile phase</p>	<p>risk assessment, evaluate, conclusion, hypothesis, equipment, apparatus, procedure, method</p>
<p>Assessment:</p>	<p>Retrieval throughout Key learning tasks at the end of each section</p>	<p>Retrieval throughout Key learning tasks at the end of each section</p>	<p>External exam Unit 1</p>	<p>Completed assignment</p>	<p>Completed assignment</p>	<p>Completed assignment</p>
<p>Key/Historical misconceptions in this unit:</p>				<p>The difference between the independent and dependent variable.</p>	<p>Mixtures have a set melting point All substances are pure</p>	<p>All substances are soluble</p>



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				The difference between the terms valid and reliable.		
Sequencing:	<p>The content of this qualification has been developed in consultation with academics to ensure that it supports progression to higher education. Employers and professional bodies have also been involved and consulted to confirm that the content is appropriate and consistent with current practice for learners planning to enter employment directly in the applied science sector.</p> <p>Learners will study three mandatory units:</p> <ul style="list-style-type: none">• Unit 1: Principles and Applications of Science I• Unit 2: Practical Scientific Procedures and Techniques• Unit 3: Science Investigation Skills. <p>Learners choose one optional unit which has been designed to support choices in progression to applied science courses in higher education – Unit 12 in year 13. The requirements of the qualification will mean that learners develop the transferable and higher order skills which are valued by higher education providers and employers. For example, when studying <i>Unit 3: Science Investigation Skills</i>, learners will develop skills including how to plan investigations, collecting, analysing, and presenting data and communicating results which support some of the skills learners need to progress to higher education, employment, self-employment or training.</p>					