



CURIOSITY

COMPASSION

COURAGE



Curriculum overview

Subject	Chemistry	Year group	13
Vision statement:	<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>		
Curriculum intent:	<p><i>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>		
Threshold Concepts (TCs):	<p><i>Rate equations and K_p</i> <i>Electrode potentials and Cells</i></p>		



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Acids, bases and pH
Period 3 elements
Transition metals
Isomerism and carbonyl compounds
Aromatic compounds and amines
Polymers
Amino acids, proteins and DNA
Further synthesis and analysis

KS4 specification summary:

The topics you will study in Yr. 13 Chemistry link to the following topics you would have studied at GCSE, the periodic table, methods of separating substances, acids, alkalis, pH of solutions, reversible reactions and equilibria, rates of reactions and heat energy in chemical reactions.

Students at KS4 study AQA GCSE Combined Science: Trilogy, which not only covers many aspects of Biology, Chemistry and Physics but also is engaging and relevant to all types of students.

In teaching this KS4 specification we've ensured that:

- The biology, chemistry and physics content is presented clearly, in a logical teaching order. We have also signposted opportunities for skills development throughout the specification.
- The subject content and required practical's are spread across all three disciplines.
- The science qualifications provide opportunities for progression. Combined Science: Trilogy gives students the option to progress to A-levels in science or other subjects

Learner skills:

Critical thinking



CRITICAL THINKING

Organisation



ORGANISATION

Collaboration



COLLABORATION

Adaptability



ADAPTABILITY

Oracy



ORACY

Self-quizzing



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



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The Big Question	What are the properties and reactions of organic and inorganic molecules and what qualitative and quantitative techniques can be used to study these molecules?					
Big picture questions:	How do we measure reaction rates? How do batteries work? Acid or base?	Acid or base? What are the trends and properties of transition metals?	What are Carbonyl compounds, Aromatic compounds, amines and polymers?	What organic molecules are inside our cells? How do we know the structure of organic molecules?	Reteach/revision Reteach/revision	Reteach/revision Reteach/revision
Content (Linked to TCs):	Unit 1 Section 8: Rate Equations and K_p <ul style="list-style-type: none"> Monitoring reactions Reaction rates and graphs Rate equations The initial rates method Clock reactions Rate-concentration graphs The rate – determining step The Arrhenius equation Gas equilibria Changing gas equilibria Section 9: Electrode potentials and Cells <ul style="list-style-type: none"> Electrode potentials 	Unit 1 Section 10: Acids, Bases and pH <ul style="list-style-type: none"> Acids, bases and K_w pH calculations the acid dissociation constant titrations and pH curves Titration calculations Buffer action Calculating the pH of buffers Unit 2 Section 3: Period 3 Elements <ul style="list-style-type: none"> Period 3 Elements Period 3 oxides Section 4: Transition metals.	Complete Section 4: Transition metals Unit 3 Section 5: Isomerism and Carbonyl Compounds <ul style="list-style-type: none"> Optical isomerism Aldehydes and ketones Hydroxynitriles Carboxylic acids and esters Reactions and uses of esters Acyl chlorides Acid anhydrides Purifying organic compounds Section 6: Aromatic Compounds and Amines <ul style="list-style-type: none"> Aromatic compounds 	Unit 3 Section 7: Polymers <ul style="list-style-type: none"> Condensation polymerisation Monomers and repeating units Disposing of polymers Section 8: Amino Acids, Proteins and DNA <ul style="list-style-type: none"> Amino acids Proteins Enzymes DNA Cisplatin Section 9: Further synthesis and analysis. <ul style="list-style-type: none"> Organic synthesis NMR spectroscopy ^{13}C NMR spectroscopy 	Revision of AS Chemistry and A level Chemistry content.	A level exams



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	<ul style="list-style-type: none"> Standard electrode potentials Electrochemical series Electrochemical cells Section 10: Acids, Bases and pH <ul style="list-style-type: none"> Acids, bases and K_w pH calculations the acid dissociation constant titrations and pH curves Titration calculations Buffer action Calculating the pH of buffers Start Unit 2 Section 3: Period 3 Elements	<ul style="list-style-type: none"> Transition metals- the basics Complex ions Isomerism and complex ions Formation of coloured ions Ligand substitution reactions Variable oxidation states Transition metal titrations Transition metal catalysts Metal-aqua ions Start Unit 3 Section 5: Isomerism and Carbonyl Compounds	<ul style="list-style-type: none"> Reactions of aromatics Amines and amides Reactions of amines 	<ul style="list-style-type: none"> ^1H NMR spectroscopy Chromatography Gas Chromatography 		
Key vocabulary:	Arrhenius equation, clock reactions, order of reaction,	Base, acid, pH, diprotic, monoprotic, ionic, hydroxonium ions, giant ionic lattices, macromolecular, amphoteric, chelate effect, entropy, enthalpy.	<i>Fehling's, Tollens, racemic, acid anhydride, distillation, crystallisation, acyl, nucleophilic, electrophile, saturated, unsaturated, achiral, enantiomers.</i>	Isoelectric point, primary structure, secondary structure, tertiary structure, nucleotide, polynucleotide and double helix. Nuclear magnetic resonance, splitting patterns, mobile phase, stationary phase, retention time		
Assessment:	Retrieval questions throughout topics Key learning tasks	Retrieval questions throughout topics Key learning tasks	Retrieval questions throughout topics Key learning tasks	Retrieval questions throughout topics Key learning tasks	Yr13 A level Chemistry paper 1, 2 and 3.	



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Key/Historical misconceptions in this unit:	<p>The definition of entropy.</p> <p>The more negative the electrode potential is the more likely the molecule will accept an electron.</p> <p>Identification of anode and cathode in fuel cells.</p> <p>The difference between a reducing agent and an oxidising agent in terms of electron acceptance and electron donation.</p>	<p>The difference between spectrometry and colorimetry.</p> <p>pH increase is an increase in $[H^+]$</p> <p>calorimetry and colorimetry</p> <p>Transition Metal colours</p> <p>Metal aqua ion colours</p>	<p>The correct drawing of arrows in organic mechanisms.</p> <p>The definition of an electrophile and nucleophile in terms of electron donation and acceptance.</p> <p>Test results</p>	<p>The use of the word adsorption in Chromatography.</p> <p>Amino acid side chains can be de-protonated and over-protonated.</p>	As per misconceptions in terms 1-4.	
Sequencing:	<p>In Year Yr13 students first study Rate equation and K_p which builds on the knowledge taught in the AS topics of Energetics and Kinetics. This also provides an opportunity for students to retrieve some of the content taught in AS Chemistry. The acids and bases topic is taught next as in the previous topic students studied gas equilibria and the first topic in acids and bases is how to derive the equilibrium constant for water thereby linking the 2 topics together. Next, the inorganic chemistry topics are taught followed by the organic chemistry topics. The organic Chemistry topic builds on the fundamentals of organic Chemistry from Yr12. The organic Chemistry topic on polymers gives an introduction to the different types of polymers this is followed by looking in more detail at the structure of particular types of polymers e.g. proteins and DNA. Finally, having studied a range of different organic molecules and their reactions students gain an understanding of the techniques which can be used to identify and separate different organic molecules.</p>					