CURIOSITY COMPASSION COURAGE

Curriculum overview

Subject	Biology	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.*		
Threshold Concepts (TCs):	1. *Energy transfer in organisms, respiration, photosynthesis and nutrient cycles* 2. *Organisms response to changes in their internal and external environment* 3. *Genetics, inheritance and populations* 4. *Control of gene expression*		

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KS4 specification summary:	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. Students are helped to understand how, through the ideas of biology, the complex and diverse phenomena of the natural world can be described in terms of a number of key ideas which are of universal application, and which can be illustrated in the separate topics set out below. These ideas include: • life processes depend on molecules whose structure is related to their function • the fundamental units of living organisms are cells, which may be part of highly adapted structures including tissues, organs and organ systems, enabling life processes to be performed more effectively • living organisms may form populations of single species, communities of many species and ecosystems, interacting with each other, with the environment and with humans in many different ways • living organisms are interdependent and show adaptations to their environment • life on Earth is dependent on photosynthesis in which green plants and algae trap light from the Sun to fix carbon dioxide and combine it with hydrogen from water to make organic compounds and oxygen • organic compounds are used as fuels in cellular respiration to allow the other chemical reactions necessary for life • the chemicals in ecosystems are continually cycling through the natural world • the characteristics of a living organism are influenced by its genome and its interaction with the environment • evolution occurs by the process of natural selection and accounts both for biodiversity and how organisms are all related to varying degrees. Students have been taught about: Cell biology Transport systems Health, disease and the development of medicines Coordination and control Photosynthesis Ecosystems Evolution, inheritance and variation
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	**What is required for cells and organisms to function?**					
Big picture questions:	**How is energy transferred between plants and animals?**	**How do organisms respond to their environment?**	**How is there variation within species?**	**How are genes expressed?**		
Content (Linked to TCs):	Section A • Photosynthesis, respiration and energy • Photosynthesis and the light dependent reaction • Photosynthesis and the light independent reaction • Limiting factors in photosynthesis • Aerobic and anaerobic respiration • Mitochondrial reactions Section B • Energy transfer in ecosystems • Farming practices and production • Nutrient cycles in natural ecosystems	Section A • Survival and response • Nervous communication • Responses in plants • Receptors • Control of heart rate Section B • Neurones • Synaptic transmission • Muscle structure • Muscle contraction Section C • Homeostasis basics • Control of blood glucose concentration • Diabetes and blood glucose concentration • The kidneys • Controlling blood water potential	Section A • Genetic terms • Simple monohybrid crosses • Multiple allele and dihybrid crosses • Linkage • Epistasis • The Chi-squared test Section B • The Hardy-Weinberg principle • Variation and selection • Speciation and genetic drift Section C • Ecosystems • Variation in population size • Investigating populations • Succession • Conservation	Section A • Mutations • Mutagenic agents • Cancer • Stem cells • Stem cells in medicine • Regulation of transcription and translation • Epigenetic control of gene expression • Phenotypes Section B • Genome projects • Making DNA fragments • Amplifying DNA fragments • Recombinant DNA technology • Gene therapy • Gene probes and medical diagnosis • Genetic fingerprinting	**Review of paper 1, 2 and 3 content in response to PPE QLA and Key learning tasks** **Essay practice**	

	• Fertilisers and eutrophication					
Key vocabulary:	NADP, ATP, glycolysis, NAD, chemiosomotic, Krebs cycle, gross primary productivity, net primary production, gross primary production and biomass.	Stimulus Tactic response Kinetic response Neurones Neurotransmitters Tropism Voltage Potential difference Receptor Chemoreceptor Homeostasis Electrochemical gradient Myofibrils Action potential Metabolic reactions Logarithm Negative feedback Diabetes Colorimetry Osmoregulation	Allele Loci Diploid Monohybrid Dihybrid Sex-linked Linked Epistasis Null hypothesis Genetic drift Selection pressure Speciation Ecosystem Niche Community Population Exponential Transect Succession	Mutation Mutagenic agents Hereditary mutations Genetic disorder Acquired mutation Tumour Transcription Translation Screen Totipotent Multipotent Pluripotent Epigenetics Genome Recombinant DNA Gene therapy		
Assessment:	**Retrieval quizzes every lesson** **Section tests** **Key Learning Task**	**Retrieval quizzes every lesson** **Section tests** **Key Learning Task**	**Retrieval quizzes every lesson** **Section tests** **Key Learning Task**	**Retrieval quizzes every lesson** **Section tests** **Key Learning Task**	**A level Exams**	**A Level Exams**
Key/Historical misconceptions in this unit:	• Students may not realize that plant cells have mitochondria and chloroplasts that	• Negative feedback is bad for the body due to the word negative (this is not the case).	• One set of alleles is responsible for determining each trait, and there are only 2 different	• All mutations are harmful • The purpose of protein synthesis is to create amino acids. However, amino acids		

	plants do not obtain ATP solely from photosynthesis, and that respiration and photosynthesis can occur simultaneously. • The light independent part of photosynthesis is not reliant on the light dependent part – light independent part of photosynthesis requires the products of the light-dependent reactions to function. • Mitochondria carry out respiration" - Mitochondria carry out aerobic respiration	• Homeostasis is more than just "keeping things normal, and the body doesn't always know what is best for itself. " The body is constantly regulating itself and the mechanisms to maintain homeostasis are always in play.	alleles (dominant and recessive) for each gene. • Your genes determine all of your characteristics, and cloned organisms are exact copies of the original. • All mutations are harmful	are not being made during translation, they are being used as building blocks to make proteins		
Sequencing:	In the second year of A level Biology, students will utilise the knowledge acquired during year 12 and apply this to wider picture scenarios. Having learnt about some of the biological processes which are essential for all organisms to exist, students will next explore the processes and genetics behind variation, which lead to the rich diversity in plants and animals. The A level Biology course will then continue to explore homeostasis within organisms (with a focus on human biology) and how genes are expressed within organisms leading to advanced DNA technologies today. Throughout the course, students will be developing their critical thinking, experimental skill and evaluative techniques during the completion of required practicals.					