



**Key Stage 5 Biology
Curriculum Map**

Year 13		
	Teacher 1	Teacher 2
<p>Content- WHAT will be learned? What previous learning can be linked? Why this order/sequence?</p>	<p><u>Homeostasis</u> This unit builds on the year 12 biological membranes unit. It looks at how internal body conditions are maintained at optimal levels for enzyme function. It also introduces concepts of hormones and neurones being involved in regulation which leads onto the next to units. Temperature control in both endotherm and ectotherms is explored. The mammalian liver and kidneys structure and function and their role in regulation of blood water and blood glucose is explored. Urine tests and their diagnosis of kidney disease and approaches to treating kidney disease.</p>	<p><u>Respiration</u> Structure of mitochondria Glycolysis Krebs cycle Oxidative phosphorylation Coenzyme in respiration and photosynthesis Energy values of respiratory substrates</p> <p>Knowledge of cellular metabolism is fundamental to most processes in the cell. Student have learnt a variety of processes that require energy in the form of ATP, this unit looks at how that ATP is formed.</p> <p>It underpins knowledge of chemiosmosis that also appear in the next photosynthesis unit.</p>
	<p><u>Neuronal communication</u> Receptors and stimuli Types of neurone Structure and function of synapses Nervous transmission Structure and function of the brain Reflexes Voluntary and Involuntary muscles Sliding filament model</p> <p>This unit reinforces earlier learning on membranes and biological molecules and the role of certain ions in the body.</p>	<p><u>Photosynthesis</u> Structure of chloroplasts Photosynthetic pigments Light dependent reaction Light independent reaction Limiting factors Factors affecting photosynthesis C3, C4 and CAM photosynthesis Photorespiration</p> <p>This unit explores the link between respiration and photosynthesis and similar underlying processes that occur in both reactions. Photosynthesis is another critical reaction in a plants metabolism.</p>

	<p><u>Hormonal communication</u> Structure and function of adrenal glands Histology of pancreas Control of blood glucose Treatments for diabetes Control of heart rate Coordinated responses</p> <p>This unit builds on the principles of homeostasis and negative feedback introduced at the start of Y13 in the homeostasis unit.</p>	<p><u>Cloning and Biotechnology</u> Natural and artificial clones Cloning Animals Cloning Plants Microorganism use for biotechnology Culturing microorganisms (in labs, batch and continuous cultures) Immobilised enzymes</p> <p>This unit reinforces prior learning on stem cells, and the different types of cell division gained in Y12, as well as the enzymes unit.</p>
	<p><u>Plant and animal responses</u> Tropisms Role of plant hormones Commercial uses of plant hormones Organisation of the mammalian nervous system Coordination of hormonal responses Control and mechanism of muscle contraction</p> <p>This unit explores how plants also regulate their internal conditions and external processes under the regulation of hormones, building on the earlier hormonal communication unit.</p>	<p><u>Patterns of inheritance & Genetics of living systems</u></p> <p>This unit looks at the different types of patterns that genes can be inherited via, and how this changes the probability that offspring will acquire certain characteristics. We look at sources of variation which reinforces Y12 knowledge of cell division. We also look at the different ways in which a whole population's genetics can change over time, which builds on evolution knowledge gained at both GCSE and in Year 12.</p>
	<p><u>Revision</u></p> <p>Students identify gaps in their knowledge using a full set of last years papers. Including a synoptic paper as this paper will have been hard to do before now as it can require students to make links between every single unit.</p>	<p><u>Manipulating Genomes</u></p> <p>PCR DNA profiling DNA sequencing and analysis Genetic engineering of bacteria Genetic engineering of plants Ethics of genetic engineering</p> <p>This unit finishes the course as a look into the future of where biotechnology is headed in relation to genetics. It reinforces</p>

	Teachers tailor revision towards where students have lost marks in practice papers and in mocks.	key principles learnt in Y12 biological molecules and nucleic acids unit.
Skills- What will be developed?	<p>Identification of histology of liver, kidneys and pancreas from microscope images</p> <p>How to make synoptic links between topics.</p> <p>Variety of practical skills which include....</p> <p>Dissection of chicken wing muscle fibres</p> <p>Safe and ethics use of animals</p> <p>Use of a data logger</p> <p>Aseptic techniques</p> <p>Dilution plating</p> <p>Chromatography</p> <p>Scientific drawing and scale bars</p> <p>Design of valid scientific experiments</p>	
Key 'How'/'Why' Questions- What powerful knowledge will be gained? What areas/themes/concepts will be explored?	<p>Why do we need to regulate internal conditions and processes?</p> <p>How do we excrete waste?</p> <p>How is blood water and blood glucose regulated?</p> <p>How do we sense incoming information and how do reflexes work?</p> <p>How do messages travel round the body?</p> <p>How do plants regulate their responses?</p>	<p>How do we release energy from the food we eat?</p> <p>How do plants harness light energy to make food?</p> <p>How are different plants metabolisms different?</p> <p>How can we clone individuals and why might we do this?</p> <p>How is the cloning process different in plants to animals?</p> <p>How and why do we culture microorganisms?</p> <p>What are the benefits and drawbacks to this?</p> <p>How are characteristics inherited and how can a populations characteristics change with time?</p> <p>How can we mimic and use fundamental genetic processes to our advantage as humans?</p>
SEND- how will support be seen? Seating plans? Simplified questions?	<p>Glossaries in the year 13 biology handbook support overlearning of key vocabulary</p> <p>Biochemical reactions built and modelled out with counters for kinaesthetic learning</p> <p>Practical skills modelled out to students</p> <p>Long term memory aided by use and access to Uplearn for recall quizzing</p> <p>Off colour slides to reduce visual overloading</p> <p>Cloze style activities and retrieval practice summary resources used at the end of every unit.</p>	
Assessment- What? Why?	<p>Summative EOUT at the end of every unit heading listed above which students receive feedback from.</p> <p>These are approximately 45 marks (depending on unit) and contain a variety of question styles to mimic and prepare them for the real exam.</p> <p>Mocks in both November and February. Feedback from these tests and mocks informs topics that need to be revised both in class and in afterschool revision sessions.</p> <p>PAG6: Thin Layer chromatography</p>	

	<p>Separation techniques assessed PAG 7: Dilution plating Microbial culturing and aseptic techniques assessed PAG 10: Yoghurt fermentation Use of data logger and computer software assessed PAG 11: Daphnia and heart rate investigation Safe and ethical use of animals assessed</p>	
<p>Literacy- reading, extended accurate writing and oracy opportunities</p>	<p>Stretch and challenge article and extended reading on.... Fish antifreeze proteins Full scientific write up of hypothesis, method, results and conclusions for PAG 11.</p>	<p>Correct scientific use of vocabulary such as valid, error, precision and accuracy. Research reading on... <ul style="list-style-type: none"> • Gene Linkage and recombination frequencies • Morning sickness tablet and birth defects scandal Stretch and challenge reading on: <ul style="list-style-type: none"> • Chromosomal sex determination <p>Extended writing for PAG practical write ups; drawing and writing scientific conclusions from data and how to write an evaluation of methods and an evaluation of other scientists' conclusions. How to write concisely and accurately when describing biochemical reactions.</p> </p>
<p>Numeracy/computing skills</p>	<p>Converting between units of different magnitude e.g. cm, mm μm and nm Calculating kidney filtration rates Standard form Percentage change Identification of trends in graph or table form Interpretation of ECG graphs.</p>	<p>Ratio Calculating rates from data and graphs Probability from genetic crosses Percentage change RQ value Rf values Chi squared Hypothesis testing Balancing equations Phenotypic ratios Hardy Weinberg Principle (Squaring, Square rooting, rearranging equations) Logarithmic growth and determining unknown exponents. Normal distribution curves and frequency</p>

<p>Character development</p>	<p>Students can learn resilience and reassurance from the fact that even the most famous of scientists theories have been improved over time, much like their own learning.</p> <p>Students learn how to be considerate and compassionate when using living organisms for investigations.</p> <p>Students develop respect and tolerance towards others with different viewpoints; for example when discussion bioethics behind genetic modification, gene therapy, vegetarianism</p> <p>Aspirations are raised from multiple extended reading and research opportunities and the facts that this is explicitly shared as a key skill for undergraduate and for showing your interest in a subject for writing a personal statement.</p>
<p>Equality/Diversity opportunities</p>	<p>Appreciation for animal rights from ethical treatment of animals in science covered in practical</p> <p>Evaluation of meat free sources of protein and veganism</p> <p>Legislation and concerns around whether to genetically engineer and gene therapy in humans; debate surrounding whether this makes us less tolerant of those with genetic diseases or disability.</p> <p>Research into determination of chromosomal sex and the natural variation in sex with the different genetic forms of hermaphroditism gives students an awareness of fluidity of sex and gender identity in nature</p> <p>Pros and cons of dialysis and kidney transplants sees the discussion of how available transplants are and blood type availability, is this affected by ethnicity, age etc.</p>
<p>Homework/Independent learning</p>	<p>Flipped learning to prepare research for future lessons</p> <p>Completion of practice exam style questions and how to actually source these to ensure this becomes an embedded skill</p> <p>Extended reading</p> <p>Use of UpLearn</p> <p>Revision summary activities</p> <p>Completion of practical write ups</p>
<p>CIAG coverage/links</p>	<p>Hospital microbiology skills developed</p> <p>Urology</p> <p>Geneticist</p> <p>Bioinformatics assistant</p> <p>Talks from ZSL on career progression in the Biology field</p>