Key Stage 5 Biology
Curriculum Map

	Year 12	
	Teacher 1	Teacher 2
Content- WHAT will be learned? What previous learning can be linked? Why this order/**sequence**?	Cell structure Students study different cell types and their structure. How are cells studied using the different types of microscopy. This builds and extends on from both GCSE knowledge and the pre-A level work. This forms a firm foundation which underpins knowledge in later units.	Biological molecules What are the different types of molecules in cells and what are their structures? How does structure of these molecules aid the function and survival of organisms. This forms a firm foundation which underpins knowledge in later units.
	Nucleic acids How does DNA structure lead to protein being formed. Builds on cell structure and biological molecules knowledge	Enzymes Method of enzyme action and as example of protein as studied in the previous unit. How is enzyme action regulated and examples of enzyme action both inside and outside of cells.
	Cell division, diversity and organisation Students look at how new cells form in the body and before reproduction. How is this regulated, and how do they become specialised starting from different types of stem cells.	Biological membranes Building on both Cells and Biological molecules, Students look at how membranes actually control what enters and leaves cells
	Exchange Surfaces Students have studied human gas exchanges systems before and look at what makes these well adapted for their function. Description and modelling of the mechanics behind breathing, as well as how to measure and quantify breathing. They then move to more unfamiliar types of gas exchange systems including fish and insects.	Transport in plants Students look at why plants require transport systems and the mechanisms behind movement of water and sugar around the plant. What environmental factors can affect water loss and how to collect data on this in a scientific manner. Builds on Cell diversity knowledge.

	Transport in animals Students are familiar with a mammalian circulatory system from GCSE but look at other types of circulatory system, including in fish and insects. Electrical conduction of heart contraction is explored further and oxygen and carbon dioxide transport within the different components of blood are explored in much greater detail.	Communicable diseases Students have an awareness of the four different pathogen types from GCSE and extend their knowledge on these in terms of their characteristics and defining features which helps to inform later lessons in the classification unit. We look at some examples of disease, how we discover and develop drugs to treat disease and how these treatments are advancing. Students also gain an appreciation for general responses to disease and specific responses to disease that lead to immunity in animals. Students are introduced to plant responses to pathogens also.
	Biodiversity Students look at why biodiversity is changing and why it is important globally. We look at methods to conserve biodiversity and the different levels at which it can be considered, and the different ways in which it can be mathematically quantified.	Classification and evolution Linking with earlier work from disease and in tandem with biodiversity, students look at how organisms on the tree of life are classified and sorted into groups, as well as how they evolved. Students have an understanding of evolution by natural selection from GCSE, but are introduced to the fact that this can actually happen in multiple different ways which are explored further and help to prepare students for population genetics in year 13 units.
	Populations and sustainability Building on the biodiversity unit, students look at factors that influence a species population size in it's environment. How can humans successfully gain resources needed for survival whilst limiting disruption or negative implications for the diversity of life found in various different fragile ecosystems	Ecosystems Building on classification, biodiversity and in tandem with the populations unit, students look at how communities in an ecosystem are linked and dependent on one another for recycling of materials. How do human impact these recycling processes in terms of climate change.
Skills- What will be developed?	Variety of practical skills. Students are encouraged to start to follow lab procedures with increasing	Variety of practical skills. Students are encouraged to start to follow lab procedures with increasing

	independence and move towards design of their own practical procedures. Practical skills include.... Principles of light microscopy and how to prepare different types of slides Principles of scientific biological drawings Extraction of DNA from practical procedures Careful and accurate dissection Scientific field work including sampling methods. Research and referencing from trustworthy sources Identification of blood cells from blood smear miscroscopy	independence and move towards design of their own practical procedures. Practical skills include.... Testing for various biological molecules Serial dilution Colourimetry Modelling of cells and estimation of water potential inside of cells Use of a potometer Interpreting an evolutionary (phylogenetic) tree diagram
Key 'How'/'Why' Questions- What **powerful knowledge** will be gained? What areas/themes/concepts will be explored?	All living things are made up of cells which join together in larger organisms to function. Their structures make them suitable for their function. How are cellular structures suitable for their function? What critical processes occur inside cells and why? Humans are just a small part of the diversity of life but are impacting all biodiversity to gain resources so this must be done responsibly.	How do molecule's structure aid their function in living things? Why and how do plants transport substances? How are different species categorised and how has our knowledge of this improved with time? How can evolution occur differently? How are fundamental biological molecules recycled in ecosystems?
SEND- how will support be seen? Seating plans? Simplified questions?	Glossaries in the year 12 biology handbook support overlearning of key vocabulary Long term memory aided by use and access to Uplearn for recall quizzing Off colour slides to reduce visual overloading Cloze style activities and retrieval practice summary resources used at the end of every unit.	
Assessment- What? Why?	Summative EOUT at the end of every unit heading listed above which students receive feedback from. These are approximately 45 marks (depending on unit) and contain a variety of question styles to mimic and prepare them for the real exam. Mocks in both January and June. PAG 1: Mitosis in garlic root tip Microscopy and scientific drawing skills assessed PAG2: Dissection of mammalian heart skills assessed PAG3: Sampling field work skills assessed PAG12: Research and referencing skills assessed	Summative EOUT at the end of every unit heading listed above which students receive feedback from. Mocks in both January and June. These are approximately 45 marks (depending on unit) and contain a variety of question styles mimic and prepare them for the real exam. Mocks in both January and June. PAG4: Enzyme activity Use of glassware, CPAC and serial dilution skills assessed PAG5: Temperature and permeability Colorimetry skills assessed PAG8: Osmosis in potato PAG9: Qualitative tests

		Use of appropriate biological reagants skill assessed
Literacy- reading, extended accurate writing and oracy opportunities	Stretch and challenge article and extended reading on…. • Huntingdon's disease. • Cell cycle and cancer article • Foetal Haemoglobin vs adult haemoglobin Oracy: Student presentations on function of different cellular organelles Research and referencing developed during biodiversity unit. Use of accurate and concise scientific summaries of processes such as transcription and translation	Correct scientific use of vocabulary such as valid, error, precision and accuracy. Stretch and challenge reading on… • Covid vaccine and it's development 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 a description of a trend in a graph How to quote data when drawing conclusions Understanding of mathematical notation such as Σ and $\bar{x}$, <, > and ≤ , ≥.
Numeracy/computing skills	Converting between units of different magnitude e.g. cm, mm µm and nm Standard form Percentage change Calculation of magnification Rearranging formulae Calibrating Eyepiece graticules Scale bars Surface area:Volume ratio Volume of cubes and spheres Calculating and interpreting lung volumes from spirometer graphs Interpreting cardiac cycle graphs in relation to changes in pressure Simpsons diversity index stats test Proportion of polymorphic gene and heterozygotes Identification of trends in graph or table form	Ratio of elements in molecules Interpretation of calibration curves and percentages Enzyme graph; plotting and interpreting Q10 coefficient Calculating rates from data and graphs Percentage change Plotting graphs with +ve **and** -ve y axis values Interpreting x axis intercept on osmosis graph Water potential symbol Ψ Volume of a cylinder Volume of a circle Calculation of mean, median and mode Calculation of rates and converting units How to plot continuous vs discontinuous data Following statistical tests: • Standard deviation • Paired t test • Unpaired t test • Spearman's rank correlation coefficient. Types of correlation Appropriate units from biomass Understanding of mathematical notation such as Σ and $\bar{x}$, <, > and ≤ , ≥.

Character development	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. Students learn how to be considerate and respectful when using animals tissues for dissection Students develop respect and tolerance towards others with different viewpoints; for example when discussion bioethics behind use of stem cells Compassion and respect are fostered towards other species on earth helping our students to become global citizens and climate conscious.	
Equality/Diversity opportunities	Equality: Reasons to conserve biodiversity and critical analysis of the role of zoos and implications for animal rights Managing delicate ecosystems and the effect of humans on the environment, balancing the need and rights of local residents to access resources and feed themselves with the need to protect a diverse habitat. Evaluation of use of embryonic stem cell in research; shortage of donor eggs and discussion of whether the embryo already has human rights and therefore whether it can give informed consent in it's use in scientific research. Rosalind Franklin's contribution to the discovery of DNA despite being a male dominated field	
Homework/Independent learning	Flipped learning to prepare for future lessons Completion of practice exam style questions and how to actually source these to ensure this becomes an embedded skill Extended reading Revision summary activities Completion of practical write ups	
CIAG coverage/links	Cardiology Medicine – UCAT/BMAT application talk Nursing Laboratory technician skills from practical endorsement qualification	