Subject Area: Biology

Curriculum Intent: To instil enthusiasm for science and to develop an interest in further study and careers associated with the subject, in the fields of medicine, engineering, environmental or other science related subjects. Through our courses we aim to equip our students with a detailed body of knowledge as well as help them build the skills required to make progress and achieve success in the scientific enterprise. A key aim is to make our students more powerful abstract, logical thinkers. Within the study of each our science courses, we enable students to develop and demonstrate a deep subject knowledge, an understanding of scientific methods, as well as develop competence and confidence in a variety of practical, mathematical, research, analytical and problem-solving skills. We also aim to extend the cultural capital of our students by increasing their scientific literacy and engagement in discussion and critical evaluation of science in the media. We aim to equip them with an understanding of the interplay between science, technology and society, the role that scientists have had in creating problems and mitigating impacts, as well as how the sciences contribute to the success of the economy and society. Complementary to this, sits our commitment to embed both the academy's professional standards and sense of civic virtue: our aim is for students to understand varying viewpoints of the scientific enterprise as well as consider the consequences and integrity of decisions and actions that they take as scientists, as individuals, and as a community, on the environment, on themselves and on others.

Dates	Content	Assessment	Rationale
Term 1	2.1 – 2.6 Basic components of living systems 3.1-3.7 Biological molecules 3.8 – 3.11 Nucelotides & nucleic acids	*PAG 1 - Use of a light microscope at high power and low power, use of a graticule.* *PAG 9 Chemical tests* PC1 - cells and membranes	Students begin their Biology A level by studying cell ultrastructure of all living organisms. Every organism is made up of one or more cells, therefore understanding the structure and function of the cell is fundamental. They then progress onto the structure and function of key biological molecules that are the building blocks for cellular structures and learn how these molecules are used in cell metabolism, storage and the transfer of genetic material. The knowledge gained in this term forms the basis of understanding of how organ systems and processes function in later topics.
Term 2	4.1 – 4.4 Enzymes 5.1 – 5.5 Plasma membranes 6.1 – 6.5 Cell Division	*PAG 4 Investigation into the effects of enzyme concentration on enzyme activity* *PAG 5 Temperature and membrane permeability* *PAG 8 Investigating the rate of diffusion through a membrane* PC2 – cells, molecules, nucleotides and nucleic acids and membranes	Students apply their knowledge from Term 1 to specific processes in the cell, that are fundamental to all organisms. This includes the importance of enzymes in biological processes, the ability of cells to communicate with each other via their membranes and the role that cell division plays in not only growth and repair but also in cell development. Throughout these topics links will be made to drug administration and development, and the roll of cell development for treating diseases. PS/CV'Students will be taught how to evaluate and form opinions on advancing medical techniques, e.g.stem cell research and be introduced into the ethics of scientific
Term 3	Module 3 – Exchange and Transport 7.1- 7.4 – Exchange surfaces and breathing 8.1 – 8.5 – Transport	*PAG 2 - Safe use of instruments for dissection of an animal organ* PC3 – Foundations in biology, exchange across a membrane and transport in animals	As animals become larger and more active, ventilation and gas exchange systems become essential to supply oxygen to, and remove carbon dioxide from, their bodies. Ventilation and gas exchange systems in mammals, bony fish and insects are used as examples of the properties and functions of exchange surfaces in animals. As animals become larger and more active, transport systems become essential to supply nutrients to, and remove waste from, individual cells. Controlling the supply of nutrients and removal of waste requires the coordinated activity of the heart and circulatory system. Another biological drawing skills opportunity and prior knowledge of enzymes, movement across a membrane, cell specialisation and tissues required.
Term 4	9.1-9.5 Transport in Plants Module 4 Biodiversity, evolution and disease 12.1 – 12.7 Communicable diseases, disease prevention and the immune system	*PAG 7 - Antibiotic effect on bacterial growth* PC4 - Foundations in biology, exchange and transport and diseases CEIAG: Career pathways in medical research	As plants become larger and more complex, transport systems become essential to supply nutrients to, and remove waste from, individual cells.Students require prior knowledge of cohesion and adhesions of water molecules from biological molecules cell specialisation, gas exchange, movement across a membrane and tissues. Organisms are surrounded by pathogens and have evolved defences against them. Medical intervention can be used to support these natural defences. The mammalian immune system is introduced.Students need to draw on their knowledge of eukaryotes and prokaryotes from cell structure, enzymes, cell division, cell specialisation and tissues. Information from the COVID pandemic is used to recognise the importance of immunisation.
Term 5	10.1 – 10.8 Classification & Evolution 11.1 – 11.8 Biodiversity	*PAG – 3 The calculation of species diversity*	Evolution has generated a very wide variety of organisms. The fact that all organisms share a common ancestry allows them to be classified. Classification is an attempt to impose a hierarchy on the complex and dynamic variety of life on Earth. Classification systems have changed and will continue to change as our knowledge of the biology of organisms develops. Prior understanding of biological molecules, DNA structure, genetics, disease, and biodiversity required
Term 6	Module 6 – Genetics, Evolution and Ecosystems 23.4 – 24.9 Succession, populations & sustainability	Trial exam – Depth and Breadth papers	Biodiversity and ecosystems link and students learn the importance of biodiversity as local and global levels and how rising populations can change biodiversity. They then move onto the role of sustainability in preserving biodiversity and local and global resources.Module 5 content links with Modules 2 & 3 and is tested on Paper 1; consequently, in order to help make clear synoptic links module 5 is delivered in its entirety before embarking on

	CEIAG: Career pathways in ecology/environmental biology	PS/CV's: Students encouraged to think about their own sustainablility and empathise with indigenous people who may have lost their land due to unsustainable working practices	module 6. This also enables spaced repetition of module 2, 3 and 5 content throughout the year. There is an emphasis on calculation work with the material covered in these topics before summer as this quickly brings the students up to answering A level standard questions and so builds confidence. 5.1.2 is taught first as this extends the work done in 3.2.3.

Dates	Content	Assessment	Rationale
Term 1	Module 5 Communication homeostasis & energy 15.1 – 15.8 Homeostasis & Excretion 13.1 – 13.10 Neuronal control CEIAG:Links to careers in medicine and physiology.	PC1 – Y1 content, communication and homeostasis, excretion,	This module looks at key processes in both plants & animals that are fundamental to an organism's survival. It starts with how animals (particularly humans) maintain a constant internal environment (homeostasis) using temperature regulation and excretion as examples. Students study in depth how the kidneys, lungs and liver are all involved in the removal of toxic products of metabolism, therefore contributing to homeostasis. Neuronal control introduces students to the use of electrical systems monitoring and responding to any deviation from the body's steady state. Students learn the fundamentals of how electrical impulses carry messages around the body and then apply this to specific areas of control such as blinking and muscle contraction. Prior knowledge from YR 12 of cell and membrane structure and transport across membranes is needed to understand how each of the three organs operates.
Term 2	14.1 – 14.4 Hormonal control 14.5 – 14.6 Coordinated responses – animals 16.1 – 16.5 Plant responses 17.1 – 17.2 Photosynthesis	*PAG 11 - Daphnia heart rate response to changes in caffeine concentration* *PAG 6 – Investigation using thin layer chromatography to separate photosynthetic pigments* PC2 – Modules 1, 2, 3 and 5 (excluding photosynthesis & respiration)	Hormonal control studies how specific hormones maintain an internal environment using diabetes and osmoregulation as specific examples. Students then study the 'fight or flight' response to understand how the nervous and endocrine system often work together to respond to a change in the environment. The content of sections 16 and 17 concentrates on plant systems. Students study the use hormones to respond to changes in their environment and how these can be used commercially. It then goes into photosynthesis in detail so that students understand how fundamental this process is in using light energy to synthesise large organic molecules. Prior knowledge of cell membranes, organelles and redox systems is required.
Term 3	17.3 – 17.4 Photosynthesis 23.1 -23.3 Ecosystems – Biomass and energy cycles (module 6) 18.1 – 18.6 Respiration	*PAG 12 – Investigating the rate of oxygen production in pondweed* Apply investigative approaches Use online and offline research skills Correctly cite sources of information PC3 -	Biomass and energy cycles are delivered after photosynthesis as it links energy transfer from the sun through food chains and food webs. Students then appreciate how this initial energy is used or lost and how humans can use this data to improve efficiency of farming techniques and how initial carbon fixed by photosynthesis is recycled. Links are also made to climate change. The subsequent teaching of respiration provides a detailed insight into the enzyme controlled reactions which result in the release of energy from organic molecules vis ATP.
Term 4	**Module 6** 19.1 – 19.3 Cellular control 20.1 – 20.6Patterns of Inheritance 21.1 – 21.5 Manipulating Genomes PS/CV's: Critically analyse ethics behind artificial selection. CEIAG: Careers in advancing	*PAG 10 - Measuring pH change during yoghurt production* *Use of data logger to collect data* PC4 Trial Examination: Past exam questions for Paper 2 (and 3 as appropriate)	The content of sections 19 and 20 links genetic control of an organism's growth and development to genetic and environmental inheritance of characteristics leading to variation within a population. It builds on knowledge from sections 10 and 11 developing a deeper understanding of how species evolve and new species are formed. Ethical considerations surrounding the use of artificial selection are discussed, using dog breeds as a specific example. Manipulating genomes is an exciting topic as students learn relatively new molecular techniques that are enabling scientists to develop new treatments for disease, identify pathogens (such as COVID) and use as a forensic tool.
Term 5	22.1 – 22.3 Cloning 22.4 – 22.8 Biotechnology	Extra PC Assessment: Past exam questions for Paper 3	These two sections explore the role of scientists in the production of artificial plant and animals clones and the use of microorganisms in biotechnology to produce food, drugs and other products. In this section students are encouraged to debate the ethics of cloning and realise the importance of microorganisms in both food and drug production. PS/CV's:Students will understand the virtue of ethics in science and the need to question the validity of
Term 6		External examinations	