BIOLOGY

Year 13

What are the aims and intentions of this curriculum?

The aim of our Post 16 Curriculum is to provide Students with the opportunity to cover a wide range of Biological concepts and to adequately prepare Students for matriculation into higher education. The teaching of practical skills is integrated with the theoretical topics and they are assessed through the written papers. For A level only, the Practical Endorsement will also support the development of practical skills and essential knowledge and understanding of different areas of the subject and how they relate to each other. The A Level in Biology A specification content is divided into six teaching modules and each module is further divided into key topics. The specification has been designed to be co-teachable with the standalone AS Level in Biology A qualification. The first four modules comprise the AS Level in Biology A course and learners studying the A level continue with the content of modules 5 and 6. The internally assessed Practical Endorsement skills also form part of the full A level.

Term	Topics	Knowledge and key terms	Skills developed	Assessment
Autumn 1	Module 5 Communication, homeostasis and energy • Neuronal communication • Hormonal communication • Homeostasis	Students will learn: • the need for communication systems in multicellular organisms • the principles of homeostasis • the term excretion and its importance in maintaining metabolism and homeostasis • the roles of mammalian sensory receptors in converting different types of stimuli into nerve impulses	Students are able to: • monitor physiological functions in ectotherms and/or endotherms. • dissect, examine and draw the external and internal structure of the kidney and the stained sections to show the histology of nephrons	• Practical work (PAG 1,2 &11) • SMART test

Autumn 2	Module 5 Communication, homeostasis and energy • Plant responses • Energy for biological processes • Respiration	Students will learn: • the types of plant responses and the role of plant hormones; to include commercial uses • the interrelationship between the process of photosynthesis and respiration • the structure of a chloroplast and the sites of the two main stages of photosynthesis • the importance of cellular respiration, describe in details the processes: glycolysis, Krebs cycle and oxidative phosphorylation	Students are able to: • carry out investigations about factors affecting phototropism and geotropism • investigate factors affecting the rate of photosynthesis. • use and interpret the respiratory quotient (RQ) formula: RQ = CO_2 produced O_2 consumed • to use sensors, data loggers and software to process data	• Practical work (PAG 4,10 &11) • SMART test
Spring 1	Module 6 Genetics, evolution and ecosystems • Genetics of living systems • Patterns of inheritance and variation	Students will learn: • the regulatory mechanisms that control gene expression at the transcriptional level, posttranscriptional level and post-translational level • the importance of mitosis and apoptosis as mechanisms controlling the development of body form. • the contribution of both environmental and genetic factors to phenotypic variation • the use of phenotypic ratios to identify linkage (autosomal and sex linkage) and epistasis • the principles of artificial selection and its uses	Students are able to: • use genetic diagrams to show patterns of inheritance • use the chi-squared ($\chi 2$) test to determine the significance of the difference between observed and expected results • use of the Hardy–Weinberg principle to calculate allele frequencies in populations	• Practical work • SMART test

Spring 2	Module 6 Genetics, evolution and ecosystems • Manipulating genomes • Cloning and biotechnology	Students will learn: • the principles of DNA sequencing and the development of new DNA sequencing techniques • the principles of the polymerase chain reaction (PCR) and electrophoresis and its application in DNA analysis. The principles and uses of electrophoresis for separating nucleic acid fragments or proteins. • the natural clones in plants and the production of natural clones for use in horticulture • natural and artificial clone in animal species • the use of microorganisms in biotechnological processes	Students are able to: • Carry out practical activity using electrophoresis • use restriction enzymes, plasmids and DNA ligase to form recombinant DNA with the desired gene and electroporation. • Dissect a selection of plant material to produce cuttings. • Carry out serial dilutions and culturing on agar plates. • calculate the number of individual organisms	• Practical work (PAG 2, 7, 6 &10) • SMART test
Summer 1	Module 6 Genetics, evolution and ecosystems • Ecosystems • Population and sustainability	Students will learn: • ecosystems, which range in size, are dynamic and are influenced by both biotic and abiotic factors • the process of primary succession in the development of an ecosystem • the factors that determine size of a population • the management of environmental resources and the effects of human activities.	Students are able to: • Calculate the efficiency of biomass transfers between trophic levels • Describe how ecosystems can be managed to balance the conflict between conservation/ preservation and human needs • Investigate the effects of human activities on the animal and plant populations	• Practical work (PAG 3) • SMART test