Biddulph High School Curriculum Intent

To deliver a broad and enriching curriculum through engaging and challenging lessons that provide a wide range of opportunities for all students to achieve their potential.
Students will all be prepared to take their next steps in a diverse and ever changing future ready to make a positive contribution to society.
Through a broad programme of extracurricular activities students will have the opportunities to showcase their talents and experience new challenges.
We value individuals and all that they can offer as well as supporting each other with kindness and empathy.

Curriculum Intent for Biology:

The lessons in the Science department provoke students' curiosity through exciting lessons; creating an environment where students will need to critically think and provide logical reasoning using various methods of investigation, such as observation, comparison, experimentation, and mathematical manipulation of data.

All teachers will follow the schemes of work and resources provided by the department. This will ensure that all students receive the same high-quality provision. All units of work will provide a clear outline of the knowledge and skills required and assessments will ensure that this knowledge has been retained and that skills can be evidenced.

Teachers will ensure that gaps are closed through regular monitoring within the classroom. DINT activities will allow for interleaving and recap of previous learning. Misconceptions will be identified through effective questioning and the regular inspection of student work.

Biology Long Term Overview						
Year Group	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
9	**Cell Structures. Animal and plant cells, cell division. culturing microorganisms**	**Osmosis, diffusion, active transport.**	**Microscopy and maths skills. The human digestive system.**	**The heart and blood vessels. Cardiovascular issues and how to treat cardiovascular disease.**	**Non-communicable disease, Health issues, The effect of lifestyle on some non-communicable diseases, cancer.**	**Plant organ systems, Transpiration. The root, stem and leaves. The xylem and the phloem vessels.**
10	**communicable diseases viral diseases Bacterial diseases fungal diseases human defence systems vaccination Producing monoclonal Discovery and development of drugs antibodies (HT only)**	**Plant disease (biology only) Plant defence responses Photosynthesis Rate of photosynthesis required practical activity 6 light intensity uses of glucose from photosynthesis aerobic respiration**	**Response to exercise Homeostasis uses of glucose from photosynthesis tests to identify starch, glucose and proteins (qualitative reagents) Hormones to treat fertility (HT only) Homeostasis he human nervous system structure and function**	**The brain (biology only) The eye (biology only) Ray diagrams and lenses Control of body temperature (biology only) Hormonal coordination in humans**	**Hormones in human reproduction Contraception The use of hormones to treat infertility (HT only) Negative feedback (HT only) Revision for mocks 28/04/25 - 02/05/25**	**Plant hormones (biology only) Required practical activity 8: tropism on seedlings Use of plant hormones (HT only) Revision for mocks**
11	**Natural selection Evidence for evolution Evolution theories**	**Sampling part 1 Sampling part 2 Biodiversity Maintaining biodiversity Monitoring biodiversity**	**Food security Feeding the world Selective breeding Genetic engineering Use of biotechnology in farming**	**Health and disease Preventing disease Monoclonal antibodies Plant disease and defences. Bloo and the body defence mechanism**	**Smoking and alcohol Exercise and diet Treating CVD New medicines Examinations**	**Revision for GCSE examinations**

				vaccinations		
12	**Basic components of Living systems. Biological molecules. Enzymes.**	**Plasma membranes. Cell division.**	**Exchanges surfaces and breathing transport in animals.**	**Transport in plants. Classification and evolution.**	**Biodiversity . Communicable diseases.**	**Neuronal communication. Hormonal communication.**
13	**Neuronal communication. Hormonal communication. Homeostasis.**	**Plant responses. Energy for biological processes. Respiration**	**Genetics of living systems. Patterns of inheritance and variation.**	**Manipulating genomes. Cloning and biotechnology.**	**Ecosystems. Populations and sustainability.**	**Preparation for A level examinations**

Biology **Medium Term Overview**			
Year 13	***Autumn Term***	**Unit Title: Communication, homeostasis and ernergy**	**No of Lessons: 48**
Overview **Assessment**	It is important that organisms, both plants and animals are able to respond to stimuli. This is achieved by communication within the body, which may be chemical and/or electrical. Both systems are covered in detail in this module. Communication is also fundamental to homeostasis with control of temperature, blood sugar and blood water potential being studied as examples. In this module, the biochemical pathways of photosynthesis and respiration are considered, with an emphasis on the formation and use of ATP as the source of energy for biochemical processes and synthesis of biological molecules. Learners are expected to apply knowledge, understanding and other skills developed in this module to new situations and/or to solve related problems. **Students will be assessed through a series of small tests to identify any misconceptions and the correct use of key scientific terminology.**		

Essential Knowledge (what must students know):	**Essential Skills (what must students be able to demonstrate):**	**Lessons to cover**
Organisms use both chemical and electrical systems to monitor and respond to any deviation from the body's steady state. The kidneys, liver and lungs are all involved in the removal of toxic products of metabolism from the blood and therefore contribute to homeostasis. The kidneys play a major role in the control of the water potential of the blood. The liver also metabolises some toxins that are ingested. The stimulation of sensory receptors leads to the generation of an action potential in a neurone.	**Learners should be able to demonstrate and apply their knowledge and understanding of:** • the types of plant responses • the roles of plant hormones • the experimental evidence for the role of auxins in the control of apical dominance • the commercial use of plant hormones • the organisation of the mammalian nervous system • the structure of the human brain and the functions of its parts	13..8 Reflexes 13.9 voluntary and involuntary muscles 13.10 sliding filament Chapter 13 assessment Chapter 13 intervention 14.4 Diabetes and its control 14.5 Coordinated responses

Transmission between neurones takes place at synapses. The ways in which specific hormones bring about their effects are used to exemplify endocrine communication and control. Type 1 diabetes is used as an example to demonstrate how medical technology is used to regulate the hormonal control systems. Plant responses to environmental changes are coordinated by hormones, some of which are important commercially. In animals, responding to changes in the environment is a complex and continuous process, involving nervous, hormonal and muscular coordination. Photosynthesis is the process whereby light from the Sun is harvested and used to drive the production of chemicals, including ATP, and used to synthesise large organic molecules from inorganic molecules. Respiration is the process whereby energy stored in complex organic molecules is transferred to ATP. ATP provides the immediate source of energy for biological processes. **Practical skills**: • practical investigations into phototropism and geotropism	• reflex actions • the coordination of responses by the nervous and endocrine systems • the effects of hormones and nervous mechanisms on heart rate • the structure of mammalian muscle and the mechanism of muscular contraction • the examination of stained sections or photomicrographs of skeletal muscle. • 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 photosynthetic pigments in photosynthesis • the light-dependent stage of photosynthesis • he fixation of carbon dioxide and the lightindependent stage of photosynthesis • the uses of triose phosphate (TP) • factors affecting photosynthesis • the need for cellular respiration • the structure of the mitochondrion • the process and site of glycolysis • the link reaction and its site in the cell • the process and site of the Krebs cycle • the importance of coenzymes in cellular respiration	14.6 controlling heart rate Chapter 14 assessment Chapter 14 intervention 15.1 The principles of homeostasis 15.2 Thermoregulation in ectotherms 15.3 Thermoregulation in endotherms 15.4 Excretion, homeostasis and the liver 15.5 The structure and function of the mammalian Kidney Kidney dissection 15.6 The kidney and osmoregulation 15.7 Urine and diagnosis 15.8 Kidney failure Chapter 15 assessment Chapter 15 intervention 16.1 Plant hormones and growth in plants 16.2 Plant responses to abiotic stress 16.3 Plant responses to herbivory 16.4 Tropisms in plants PAG 11.3 Investigation into phototropism 16.5 The commercial use of plant hormones Chapter 16 assessment Chapter 16 intervention 17.1 Energy cycles 17.2 ATP synthesis 17.3 Photosynthesis PAG 6.3 TLC Photosynthetic pigments 17.4 Factors affecting photosynthesis PAG 12.3 Oxygen rate in pondweed Chapter 17 assessment Chapter 17 intervention 18.1 Glycolysis 18.2 Linking glycolsys and the Krebs cycle

• the experimental evidence for the role of auxins in the control of apical dominance • Learners should be able to apply their knowledge and understanding to different experiments. Learners are not required to recall specific experiments. • practical investigations into the effect of plant hormones on growth • To include the use of hormones to control ripening, the use of rooting powders and hormonal weed killers. • practical investigations into factors affecting the rate of photosynthesis • practical investigations into respiration rates in yeast, under aerobic and anaerobic conditions • practical investigations into the effect of factors such as temperature, substrate concentration and different respiratory substrates on the rate of respiration • PAG4, PAG10, PAG11	• the process and site of oxidative phosphorylation • the chemiosmotic theory • the process of anaerobic respiration in eukaryotes • the difference in relative energy values of carbohydrates, lipids and proteins as respiratory substrates • the use and interpretation of the respiratory quotient (RQ)	18.3 The krebs cycle Oxidative phosphorylation 18.5 Anaerobic respoiration 18.6 Respiratory substrates Chapter 18 assessment Synoptic links: - Membranes - Homeostasis - Transport in animals - Neuronal communication - Qualitative tests Synoptic links: - Membranes and their structure - Movement of substances Animal responses Synoptic links: - Protein structure - Cell membranes - Qualitative tests - Homeostasis - Movement of substances - Genetic Engineering (GCSE) Synoptic links: - Photosynthesis - Cell signalling

Examination technique: understanding key command words within examination style questions to build confidence in student responses		- Cell membranes - Homeostasis Synoptic links: - Synapses - Protein structure - ATP Cardiac Cycle **Homework** SENECA learning and examination style questions to support learning and improve skill. Work booklet for homework tasks. Completion of additional reading and research.
Careers Link EKG technician. Exercise physiologist. Cardiovascular technician. Respiratory therapist. Medical sonographer. Cardiology consultant. Cardiac nurse. Cardiology physician.	**Maths skills required:** Maths opportunity to calculate standard deviation and calculate Student's t-test. Maths opportunity to calculate standard deviation and Student's t-test Maths opportunity to calculate Rf values, rates and interpret and plot graphs. Maths opportunity to calculate respiratory quotient (RQ), plot and interpret graphs	**MY PB** **Social Me- active listening, speaking effectively, working with others** Practical work will require resilience and responsibility. **Thinking Me – evaluating & creativity** Evaluation will be utilised when comparing different methods of microscopy **This is Me – Resilience, responsibility, self-motivation, integrity, self-management** Students will need to demonstrate resilience and self-management when looking at the assessed points across the lessons

Biology **Medium Term Overview**			
Year 13	***Spring term***	**Module 3 exchange and transport**	**No of Lessons: 53**
Overview	This module covers the role of genes in regulating and controlling cell function and development. Heredity and the mechanisms of evolution and speciation are also covered. Some of the practical techniques used to manipulate DNA such as sequencing and amplification are considered and their therapeutic medical use. The use of microorganisms in biotechnology is also covered. Both of these have associated ethical considerations and it is important that learners develop a balanced understanding of such issues. Learners gain an appreciation of the role of microorganisms in recycling materials within the environment and maintaining balance within ecosystems. The need to conserve environmental resources in a sustainable fashion is considered, whilst appreciating the potential conflict arising from the needs of an increasing human population. Learners also consider the impacts of human activities on the natural environment and biodiversity. Learners are expected to apply knowledge, understanding and other skills developed in this module to new situations and/or to solve related problems.		
Assessment	**Students will be assessed through a series of small tests to identify any misconceptions and the correct use of key scientific terminology.**		

Essential Knowledge (what must students know)	**Essential Skills (what must students be able to demonstrate):**	**Lessons to cover**
The way in which cells control metabolic reactions determines how organisms, grow, develop and function. Isolating mechanisms can lead to the accumulation of different genetic information in populations, potentially leading to new species. Over a prolonged period of time, organisms have changed and some have become extinct. The theory of evolution explains these changes. Humans use artificial selection to produce similar changes in plants and animals.	***Learners should be able to demonstrate and apply their knowledge and understanding of:*** • types of gene mutations and their possible effects on protein production and function • the regulatory mechanisms that control gene expression at the transcriptional level, posttranscriptional level and post-translational level the genetic control of the development of body plans in different organisms	MOCKS X4 21.1 DNA profiling 21.2 DNA sequencing and analysis 21.3 Using DNA sequencing 21.4 Genetic engineering 21.5 Gene tech and ethics Chapter 21 assessment

Genome sequencing gives information about the location of genes and provides evidence for the evolutionary links between organisms. Genetic engineering involves the manipulation of naturally occurring processes and enzymes. The capacity to manipulate genes has many potential benefits, but the implications of genetic techniques are subject to much public debate. Farmers and growers exploit "natural" vegetative propagation in the production of uniform crops. Artificial clones of plants and animals can now be produced. Biotechnology is the industrial use of living organisms (or parts of living organisms) to produce food, drugs or other product. Organisms do not live in isolation but engage in complex interactions, not just with other organisms but also with their environment. The efficiency of biomass transfer limits the number of organisms that can exist in a particular ecosystem. Ecosystems are dynamic and tend towards some form of climax community. There are many factors that determine the size of a population. For economic, social and ethical reasons ecosystems may need to be carefully managed. To support an increasing human population, we need to use biological resources in a sustainable way.	• 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 • how sexual reproduction can lead to genetic variation within a species • genetic diagrams to show patterns of inheritance • the use of phenotypic ratios to identify linkage (autosomal and sex linkage) and epistasis • the genetic basis of continuous and discontinuous variation • the factors that can affect the evolution of a species • the role of isolating mechanisms in the evolution of new species • the principles of artificial selection and its uses • the ethical considerations surrounding the use of artificial selection. • the principles of DNA sequencing and new DNA sequencing techniques • how gene sequencing has allowed for genome-wide comparisons between individuals and between species • how gene sequencing has allowed for the sequences of amino acids in polypeptides to be predicted	Chapter 21 intervention 22.1 Natural cloning in plants 22.2 Artificial cloning in plants 22.3 Cloning in animals 22.4 Microorganisms and biotechnology PAG 10.3 Yoghurt pH 22.5 Microorganisms, medicines and bioremediation 22.6 Culturing microorganisms in the lab PAG 7.2 Culturing microorganisms in the lab 22.7 Culturing microorganisms on an industrial scale 22.8 Immobilised enzymes Chapter 22 assessment Chapter 22 intervention **Common misconceptions:**. With regards to the menstrual cycle, research has shown that learners have problems relating the time of conception to the condition of the lining of the uterus.

Practical skills: practical investigations into the factors affecting the growth of microorganisms how to culture microorganisms effectively, using aseptic techniques An opportunity for serial dilutions and the use of broth **Examination technique:** understanding key command words within examination style questions to build confidence in student responses.	• how gene sequencing has allowed for the development of synthetic biology • the principles of DNA profiling and its uses • the principles of the polymerase chain reaction (PCR) and its application in DNA analysis • the principles and uses of electrophoresis for separating nucleic acid fragments or proteins • the principles of genetic engineering • the techniques used in genetic engineering • the ethical issues (both positive and negative) relating to the genetic manipulation of animals (including humans), plants and microorganisms • the principles of, and potential for, gene therapy in medicine • natural clones in plants and the production of natural clones for use in horticulture • how to take plant cuttings as an example of a simple cloning technique • the production of artificial clones of plants by micropropagation and tissue culture • the arguments for and against artificial cloning in plants • natural clones in animal species • how artificial clones in animals can be produced by artificial embryo twinning	**Homework** SENECA learning and examination style questions to support learning and improve skill. Work booklet for homework tasks. Completion of additional reading and research.

	or by enucleation and somatic cell nuclear transfer (SCNT) • the arguments for and against artificial cloning in animals • the use of microorganisms in biotechnological processes • the advantages and disadvantages of using microorganisms to make food for human consumption • how to culture microorganisms effectively, using aseptic techniques • the importance of manipulating the growing conditions in batch and continuous fermentation in order to maximise the yield of product required • the standard growth curve of a microorganism in a closed culture • practical investigations into the factors affecting the growth of microorganisms • the uses of immobilised enzymes in biotechnology and the different methods of immobilisation. • ecosystems, which range in size, are dynamic and are influenced by both biotic and abiotic factors • biomass transfers through ecosystems • recycling within ecosystems • the process of primary succession in the development of an ecosystem • how the distribution and abundance of organisms in an ecosystem can be measured	

	• the use of sampling and recording methods to determine the distribution and abundance of organisms in a variety of ecosystems. • the factors that determine size of a population • interactions between populations • the reasons for, and differences between, conservation and preservation • how the management of an ecosystem can provide resources in a sustainable way • the management of environmental resources and the effects of human activities.	
Careers Link Biotechnologists create and improve products and processes for agriculture, medicine and conservation using biological organisms. They study the genetic, chemical and physical attributes of cells, tissues and organisms, and identify industrial uses for them.	**Maths skills:** • using the chi-squared ($\chi 2$) test to determine the significance of the difference between observed and expected results • the use of the Hardy–Weinberg principle to calculate allele frequencies in populations • The equations for the Hardy–Weinberg principle will be provided where needed in assessments and do not need to be recalled. p p2 1 • To include the formula for number of individual organisms n N = N0 # 2	**MY PB** **Social Me- active listening, speaking effectively, working with others** Practical work will require resilience and responsibility. **Thinking Me – evaluating & creativity** Evaluation will be utilised when comparing different methods of microscopy **This is Me – Resilience, responsibility, self-motivation, integrity, self-management** Students will need to demonstrate resilience and self-management when looking at the assessed points across the lessons

	• The formula for the chi-squared ($\chi 2$) test will be provided. • efficiency 100 biomass intake biomass transferred = •	

Biology **Medium Term Overview**			
Year 10	***Summer term***	**Title: Revision and preparation for A level examinations**	**No of Lessons:24**
Overview	This term will be used to support year 12 students in revising for their mock examinations and identifying any curriculum gaps and how to close these curriculum gaps through bespoke revision techniques and revision lessons to support growth in learning in science.		
Assessment	**Biological processes (Component 01)** This component is worth 100 marks, is split into two sections and assesses content from teaching modules 1, 2, 3 and 5. Learners answer all the questions. Section A contains multiple choice questions. This section of the paper is worth 15 marks. Section B includes short answer question styles (structured questions, problem solving, calculations, practical) and extended response questions. This section of the paper is worth 85 marks. **Biological diversity (Component 02)** This component is worth 100 marks, is split into two sections and assesses content from teaching modules 1, 2, 4 and 6. Learners answer all the questions. Section A contains multiple choice questions. This section of the paper is worth 15 marks. Section B includes short answer question styles (structured questions, problem solving, calculations, practical) and extended response questions. This section of the paper is worth 85 marks. **Unified biology (Component 03)** This component assesses content from across all teaching modules 1 to 6. Learners answer all the questions. This component is worth 70 marks. Question styles include short answer (structured questions, problem solving, calculations, practical) and extended response questions		

	Practical Endorsement in biology (Component 04) Performance in this component is reported separately to the performance in the A level as measured through externally assessed components 01 to 03. This non-exam assessment component rewards the development of practical competency in biology and is teacher assessed. Learners demonstrate competence in the range of skills and techniques specified in Section 1.2 of the specification by carrying out a minimum of 12 assessed practical activities. The Practical Endorsement is teacher assessed against the Common Practical Assessment Criteria as specified in Section 5f. Learners may work in groups but must demonstrate and record independent evidence of their competency. Teachers who award a pass to their learners must be confident that each learner consistently and routinely exhibits the competencies listed in Section 5f and has demonstrated competence in all the apparatus and techniques detailed in Section 1.2.2 before completion of the A level course. The practical activities provided by OCR are all mapped against the specification and assessment criteria.
