Biology A Level — Key Stage 5 Curriculum Plan — Year 13

Exam Board: *AQA*
Qualification: *GCE Biology 7402*
Assessment Information: *Paper 1 (topics 1-4), Paper 2 (topics 5-8) and Paper 3 (synoptic paper + essay). Each exam is 120 minutes in length*
Link to official specification

Department Information:
Physics, Biology and Chemistry are popular and successful subjects at Furze Platt. The Department aims to provide a supportive, stimulating, dynamic and academically challenging experience for all students. Over recent years, the Department has gone from strength to strength, and standards and students' results are high.
In Year 13, those students studying the Biology A-level course will receive 9 hours of Biology teaching per fortnight.

ACHIEVE in the curriculum:
*The curriculum has been designed with the ACHIEVE values at its core. Lessons have been written to encourage **ambition** and have also been written with the intent of being enjoyable and giving opportunities for students to celebrate their own successes. **Collaboration** is a key aspect of the scientific method and students will develop this and their **versatility** through required practical activities, as well as through paired and group classwork. Students will develop **integrity** through their completion of independent learning and through self-marking and peer-marking their work. Students will develop **endurance** through the completion of consolidatory activities such as past exam papers.*

Curriculum Aims and Intent:
The AQA A-level Biology course aims to develop students' knowledge and understanding of biological principles, as well as their practical and analytical skills. The curriculum is designed to prepare students for higher education or careers in scientific fields while fostering a passion for biology.

- **Develop comprehensive biological knowledge** by providing a broad understanding of core biological concepts, including cell biology, biochemistry, genetics, ecology, physiology, and evolution.
- **Encourage application of knowledge** by equipping students with the ability to apply biological knowledge to new and unfamiliar contexts, including problem-solving and decision-making.
- **Enhance practical skills** by promoting proficiency in practical and experimental skills through hands-on lab work, encouraging students to develop scientific inquiry, observation, and measurement skills.
- **Develop analytical and critical thinking** by fostering by interpreting data, analysing trends, and evaluating the reliability of information from experiments or secondary sources.
- **Prepare for higher education and careers** by laying the foundation for further study in biology, biomedical sciences, or related fields, and prepare students for scientific and non-scientific careers by developing transferable skills such as data analysis and critical thinking.

- **Encourage scientific literacy and awareness** by enabling students to become scientifically literate and informed citizens, aware of the role of biology in addressing global issues such as health, sustainability, and conservation.
- **Instil a passion for Biology** by cultivating a deeper interest in the living world and an appreciation for the complexity and diversity of life.

Resources:

- Summer transition work: HeadStart to A-level Biology (CGP Guide) ISBN-13: **978-1782942795**
- Oxford University Press A-Level Biology textbook (available on Kerboodle and Amazon) ISBN-13: **978-0198351771**
- Kerboodle https://kerboodle.com
- PMT (for past paper questions) https://www.physicsandmathstutor.com/biology-revision/gcse-aqa/
- Ms Estruch Biology: https://www.youtube.com/@MissEstruchBiology

How we keep parents informed:

Year 13 - Progress reports are published 4 times per year, in October, November and February, with a face-to-face parents' evening in December.

How parents can help their child:

Assist with filing and folder organisation
Ensue that students are consolidating their learning after every lesson. Students should be spending at least 9 hours per fortnight consolidating their learning
Ensuring that students are actively engaged with their learning through the regular use of mind maps, flash cards, blurting etc.
Encourage the completion and marking of past paper questions
Encourage students to explore beyond the specification (documentaries, podcasts, reading of scientific journals, keeping abreast of scientific developments in the news)
Liaise with teachers and attend Parents' evening

What we study and when:					
Term	**Unit, Topic or Summary of Work Covered**	**Knowledge, Understanding & Skills Developed**	**ACHIEVE / Personal Development Focus**	**How The Work Is Assessed**	**Careers Links**
1	**Photosynthesis**	**Knowledge:** Students will learn about the process of photosynthesis, including the light-dependent and light-independent reactions (Calvin cycle), the role of chlorophyll, and the structure of chloroplasts. **Understanding:** Students will understand how light energy is converted into chemical energy, the importance of photosynthesis in the carbon cycle, and factors affecting the rate of photosynthesis (light intensity, temperature, CO_2 concentration). **Skills Developed:** • Investigating the effect of light intensity on photosynthesis • Analysing data from photosynthetic rate experiments (e.g., oxygen production) • Understanding the significance of photosynthesis in ecosystems • Evaluating the impact of environmental factors on photosynthesis efficiency	As above but in a biological context: **Ambitious** Photosynthesis represents an ambitious process where organisms convert sunlight into chemical energy, showcasing nature's complexity and efficiency. Understanding this process encourages students to appreciate the scale of natural systems and their potential for sustainable energy solutions.	End-of-unit test	Agricultural Scientist Agricultural scientists study photosynthesis to develop more efficient crops and sustainable farming practices that enhance food production and environmental health.
	Respiration	**Knowledge:** Students will learn about the different types of respiration, including aerobic and anaerobic respiration, and the stages involved (glycolysis, Krebs cycle, electron transport chain). **Understanding:** Students will understand how energy is released from glucose during respiration, the importance of ATP as an energy carrier, and the differences between aerobic and	As above but in a biological context: **Endurance** Respiration illustrates endurance as it is a	End-of-unit test	Exercise Physiologist Exercise physiologists analyse the respiratory processes during physical activity, helping individuals improve their fitness and manage health conditions

		anaerobic pathways. They will also explore the role of respiration in metabolism and energy transfer within cells. **Skills Developed:** • Investigating the factors affecting respiration rates in organisms • Analysing data from experiments measuring CO_2 production or oxygen consumption • Understanding the implications of anaerobic respiration (e.g., fermentation) • Evaluating the efficiency of different respiratory pathways in energy production	vital process that continuously provides energy to organisms, allowing them to survive and thrive. Students learn that despite varying environmental conditions, organisms adapt their metabolic pathways to sustain life.		through tailored exercise programs.
	Response to stimuli	**Knowledge:** Students will learn about the mechanisms of response to stimuli in organisms, including the nervous system and hormonal responses. They will study sensory receptors, effectors, and the roles of neurons in signal transmission. **Understanding:** Students will understand how organisms detect and respond to changes in their environment, the pathways of nervous impulses, and the differences between voluntary and involuntary responses. They will explore reflex arcs, synaptic transmission, and the role of hormones in coordinating responses. **Skills Developed:** • Investigating the structure and function of neurons • Analysing reflex action responses and their pathways • Conducting experiments to measure reaction times • Understanding the interaction between the nervous and endocrine systems in response to stimuli	As above but in a biological context: **Versatility** The ability of organisms to respond to stimuli demonstrates versatility in adapting to their environments. Students recognize how different organisms employ various mechanisms to survive, highlighting the importance of adaptability in biological systems.	End-of-unit test	Neuroscientist Neuroscientists study how organisms respond to stimuli, advancing our understanding of brain function and leading to developments in treatments for neurological disorders.

2	**Homeostasis**	**Knowledge:** Students will learn about the concept of homeostasis and the mechanisms involved in maintaining a stable internal environment in organisms, including temperature regulation, pH balance, and glucose levels. **Understanding:** Students will understand the processes of negative and positive feedback in homeostatic control, the roles of the endocrine and nervous systems, and the significance of homeostasis for overall health and survival. **Skills Developed:** • Analysing homeostatic mechanisms in various organisms (e.g., thermoregulation, osmoregulation) • Investigating the effects of external factors on internal conditions • Evaluating case studies of homeostatic imbalances (e.g., diabetes) • Conducting experiments to measure physiological responses to environmental changes	As above but in a biological context: **Integrity** Homeostasis reflects integrity as it involves maintaining a stable internal environment, essential for the health and functionality of organisms. Students learn that maintaining homeostasis is crucial for integrity at the cellular and systemic levels, reinforcing the importance of balance in life.	End-of-unit test	Clinical Physiologist Clinical physiologists monitor physiological processes to ensure homeostasis in patients, playing a key role in diagnosing and treating various health conditions.
	Nervous coordination and muscles	**Knowledge:** Students will learn about the structure and function of the nervous system, including the central and peripheral nervous systems, neurons, synapses, and the role of neurotransmitters. They will study the structure of skeletal muscle and the mechanisms of muscle contraction. **Understanding:** Students will understand how nervous impulses coordinate responses, the processes involved in synaptic transmission, and the sliding filament theory of muscle contraction. They will explore the relationship between nerve	As above but in a biological context: **Collaborative** Nervous coordination and muscle function illustrate collaboration among different	End-of-unit test	Physical Therapist Physical therapists use their understanding of nervous coordination and muscle function to help patients recover from injuries and improve movement.

		impulses and muscle movements, including voluntary and involuntary actions. **Skills Developed:** • Investigating the structure of neurons and muscle fibres • Analysing the physiological processes of muscle contraction • Conducting experiments on reaction times and muscle responses • Understanding the effects of exercise on muscle function and fatigue	systems within the body. Students explore how the nervous system works with muscular systems to produce coordinated movements, teamwork in biological processes.		
3	**Inheritance**	**Knowledge:** Students will learn about the principles of inheritance, including Mendelian genetics, dominant and recessive alleles, genotypes, phenotypes, and the role of alleles in determining traits. They will study monohybrid and dihybrid crosses. **Understanding:** Students will understand how traits are passed from parents to offspring, the concept of probability in inheritance patterns, and the influence of environmental factors on phenotypic expression. They will explore genetic disorders and the implications of inheritance in populations. **Skills Developed:** • Analysing genetic crosses and constructing Punnett squares • Investigating the inheritance of traits in plants or animals • Evaluating pedigree charts to track inheritance patterns • Applying knowledge of inheritance to real-world genetic scenarios and ethical considerations	As above	End-of-unit test	Geneticist Geneticists research and explore inheritance patterns, contributing to advancements in gene therapy, personalised medicine, and our understanding of genetic diseases.
4	**Populations and evolution**	**Knowledge:** Students will learn about the concepts of populations, species, and evolution, including natural selection, genetic drift, and speciation. They will explore population	As above but in a biological context:	End-of-unit test	Evolutionary Biologist Evolutionary biologists study

		dynamics, Hardy-Weinberg equilibrium, and factors influencing population size and distribution. **Understanding:** Students will understand how evolutionary processes shape genetic variation within populations, the mechanisms driving speciation, and the impact of environmental changes on population evolution. They will also study the evidence for evolution, such as fossil records and molecular biology. **Skills Developed:** • Analysing data on population genetics and allele frequencies • Conducting experiments to study natural selection in controlled environments • Evaluating case studies of evolution and speciation • Applying Hardy-Weinberg principles to real-world population data	**Ambitious** Populations and evolution embody ambition as they explore the dynamic changes in species over time, driven by natural selection and adaptation. This topic encourages students to think about the broader implications of evolutionary processes and their impact on biodiversity.		population dynamics and evolutionary processes, providing insights into species adaptation and conservation strategies.
5	**Populations in ecosystems**	**Knowledge:** Students will learn about the interactions between populations within ecosystems, including predator-prey relationships, competition, symbiosis, and carrying capacity. They will study the dynamics of population growth and regulation. **Understanding:** Students will understand how biotic and abiotic factors influence population size, distribution, and interactions. They will explore the roles of keystone species and the concept of ecological niches within ecosystems. **Skills Developed:** • Analysing population data and trends within ecosystems • Conducting field studies to assess population dynamics • Evaluating the impact of human activities on populations and ecosystems	As above but in a biological context: **Collaborative** Populations within ecosystems thrive through collaborative interactions, such as predator-prey relationships and symbiosis. Students learn that cooperation and competition shape community dynamics,	End-of-unit test	Wildlife Biologist Wildlife biologists study populations within ecosystems to manage and conserve wildlife, ensuring the sustainability of species and habitats.

		• Applying ecological models to predict population changes and interactions	illustrating the interdependence of species.		
	Gene expression	**Knowledge:** Students will learn about the processes involved in gene expression, including transcription, RNA processing, translation, and the roles of various types of RNA (mRNA, tRNA, rRNA). They will study regulatory mechanisms that control gene expression. **Understanding:** Students will understand how gene expression is influenced by both internal and external factors, including epigenetics, transcription factors, and environmental signals. They will explore how changes in gene expression can affect cell function and contribute to development and disease. **Skills Developed:** • Analysing the steps of transcription and translation in gene expression • Investigating the effects of environmental changes on gene expression • Conducting experiments to study the regulation of specific genes • Evaluating case studies on the role of gene expression in health and disease	As above but in a biological context: **Integrity** The study of gene expression involves sensitive and ethical considerations, especially when discussing genetic modification and personalized medicine. Maintaining integrity in these discussions is crucial, as it requires professionals to communicate transparently and responsibly about the implications and potential consequences of genetic research.	End-of-unit test	Biomedical Scientist Biomedical scientists investigate gene expression and its implications for health, contributing to diagnostics and therapeutics in healthcare.
6	**Recombinant DNA technology**	**Knowledge:** Students will learn about the principles and techniques of recombinant DNA technology, including gene cloning, restriction enzymes, vectors, and transformation. They	As above but in a biological context: **Versatility**	End-of-unit test	Biotechnology Technician Biotechnology technicians work with recombinant DNA

		will study applications of recombinant DNA technology in medicine, agriculture, and research. **Understanding:** Students will understand how recombinant DNA technology is used to manipulate genetic material for various purposes, such as producing insulin, genetically modified organisms (GMOs), and gene therapy. They will explore ethical considerations and potential risks associated with genetic manipulation. **Skills Developed:** • Analysing the process of cloning a gene into a plasmid vector • Conducting experiments involving DNA extraction and restriction digestion • Evaluating the effectiveness of recombinant DNA applications • Understanding the implications of genetic engineering on biodiversity and ethics	Recombinant DNA technology showcases versatility in its application across various fields, from medicine to agriculture. Students learn how genetic engineering can solve diverse problems, emphasising the adaptability of science in addressing global challenges.		technology in laboratories, assisting in genetic engineering projects and the development of biopharmaceuticals.