

Beths Grammar School KS5 Biology Curriculum Map – Year 13

PLEASE NOTE: 2026–27 is the final year that Pearson Edexcel A Level Biology A (Salters-Nuffield) will be taught. From September 2027, Year 13 will continue the OCR A Level Biology A (H420) specification started in Year 12.

How to read this map: one row per half-term; Teacher A (Topics 5 and 7) and Teacher B (Topics 6 and 8) are shown side by side.

Key: **Green** = sustainability in context. **Big question** = conversation starter for home. **Maths** / **Working scientifically** = skills developed (Edexcel describes these by topic, not by code).

Term	INTENT	IMPLEMENTATION		IMPACT
	Substantive Knowledge This is the specific, factual content for the topic, which should be connected into a careful sequence of learning.	Disciplinary Knowledge (Skills) Teacher A Topics 5 and 7	Disciplinary Knowledge (Skills) Teacher B Topics 6 and 8	Assessment opportunities What assessments will be used to measure student progress? Evidence of how well students have learned the intended content.
Pearson Edexcel A Level Biology A (Salters-Nuffield) (9BN0) Autumn Term 1A Year 13 (Sept – Oct)	Intent Why is this taught now? <i>Year 13 opens with two topics taught in parallel. Topic 5 revisits photosynthesis and ecology from Year 12 at greater depth, and Topic 6 builds on cell structure and DNA from Year 12, moving from bacteria and viruses straight into the diseases they cause.</i> Teacher A: Topic 5 – On the Wild Side Teacher B: Topic 6 – Immunity, Infection and Forensics Big question: <i>How does energy flow through ecosystems, and how can biology solve a crime?</i>	Topic 5 – On the Wild Side 5.1 – Understand the terms ecosystem, community, population and habitat. 5.2 – Understand that the numbers and distribution of organisms in a habitat are controlled by biotic and abiotic factors. 5.3 – Understand how the concept of niche accounts for distribution and abundance of organisms in a habitat. 5.4 – Understand the stages of succession from colonisation to a climax community. 5.5 – Understand the overall reaction of photosynthesis as requiring energy from light to split apart the strong bonds in water molecules, storing the hydrogen in a fuel (glucose) by combining it with carbon dioxide and releasing oxygen into the atmosphere. 5.6 – Understand how phosphorylation of ADP requires energy and that hydrolysis of	Topic 6 – Immunity, Infection and Forensics 6.1 – Understand how to determine the time of death of a mammal by examining decomposition, stage of succession, forensic entomology, body temperature and degree of muscle contraction. 6.2 – Know the role of micro-organisms in the decomposition of organic matter and the recycling of carbon. 6.3 – Know how DNA profiling is used for identification and determining genetic relationships between organisms (plants and animals). 6.4 – Know how DNA can be amplified using the polymerase chain reaction (PCR). 6.5 – Be able to compare the structure of bacteria and viruses. 6.6 – Understand how Mycobacterium tuberculosis (TB) and Human Immunodeficiency Virus (HIV) infect human	• Checkpoint questions (Topics 5 and 6) • Test on photosynthesis • Test on ecology • Test on forensic science • Disease test • A Level Paper 1: The Natural Environment and Species Survival (Topics 1–6) • A Level Paper 2: Energy, Exercise and Co-ordination (Topics 1–4, 7–8) • A Level Paper 3: General and

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	Topic 5 uses climate change and the polar bear as its storyline. Learners study ecosystems, succession, photosynthesis and energy transfer. Topic 6 uses a forensic storyline: learners study DNA profiling, PCR and how time of death is estimated, then the structure of bacteria and viruses, TB and HIV, immunity, antibiotics and resistance.	ATP provides an immediate supply of energy for biological processes. 5.7 – Understand the light-dependent reactions of photosynthesis, including photophosphorylation and the photolysis of water. 5.8 – i) Understand the light-independent reactions (the Calvin cycle and the roles of GP, GALP, RuBP and RUBISCO); ii) know that the products are simple sugars used in respiration and the synthesis of new biological molecules. 5.9 – Understand the structure of chloroplasts in relation to their role in photosynthesis. 5.10 – i) Be able to calculate net primary productivity; ii) understand the relationship between gross primary productivity, net primary productivity and plant respiration. 5.11 – Know how to calculate the efficiency of biomass and energy transfers between trophic levels. Core Practical 10 – Carry out a study on the ecology of a habitat, such as using quadrats and transects to determine distribution and abundance of organisms, and measuring abiotic factors appropriate to the habitat. Core Practical 11 – Investigate photosynthesis using isolated chloroplasts (the Hill reaction).	cells, causing a sequence of symptoms that may result in death. 6.10 – Understand how one gene can give rise to more than one protein through post-transcriptional changes to messenger RNA (mRNA). 6.11 – i) Know the major routes pathogens may take when entering the body; ii) understand the role of barriers, including skin, stomach acid, and gut and skin flora. 6.12 – Understand how individuals may develop immunity (natural, artificial, active, passive). 6.13 – Understand how the theory of an 'evolutionary race' between pathogens and their hosts is supported by the evasion mechanisms shown by pathogens. 6.14 – Understand the difference between bacteriostatic and bactericidal antibiotics. 6.15 – Know how an understanding of the causes of hospital acquired infections has led to codes of practice for antibiotic prescription and infection control. Core Practical 14 – Use gel electrophoresis to separate DNA fragments of different length. Core Practical 15 – Investigate the effect of different antibiotics on bacteria.	Practical Applications in Biology (Topics 1–8) • Practical Endorsement (CPAC): core practicals recorded in lab books • In-class retrieval practice and exam questions • Homework activities
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		Key maths skills • use ratios, fractions and percentages to calculate productivity and the efficiency of energy transfer • understand the principles of sampling and use a statistical test (CP10) • plot two variables and draw a tangent to find a rate (CP11) Working scientifically • plan and carry out fieldwork, measuring abiotic factors (CP10) • follow written procedures and use equipment safely (CP11)	Key maths skills • estimate results and use decimal and standard form (e.g. PCR doubling of DNA) • use power and exponential functions, e.g. DNA copies after PCR cycles and bacterial growth • calculate areas of clear zones using πr^2 (CP15) Working scientifically • follow written procedures and use equipment safely (CP14) • use aseptic techniques safely (CP15) • use evidence to reach conclusions, e.g. estimating time of death • evaluate codes of practice for antibiotic use (6.15)	
Autumn Term 1B Year 13 (Nov – Dec) Sustainability in carbon cycle lesson	Intent Why is this taught now? <i>With ecosystems and photosynthesis secure, Topic 5 moves to climate change, its effects on organisms and evolution. Topic 6 finishes with the non-specific and specific immune responses, building on the pathogens and immunity studied in 1A.</i> Teacher A: Topic 5 – On the Wild Side (completed) Teacher B: Topic 6 – Immunity, Infection and Forensics (completed)	Topic 5 – On the Wild Side – continued 5.12 – Understand the different types of evidence for climate change and its causes (CO₂ records, temperature records, pollen in peat bogs and dendrochronology), recognising correlations and causal relationships. 5.13 – Understand the causes of anthropogenic climate change, including the role of greenhouse gases (carbon dioxide and methane) in the greenhouse effect. 5.14 – i) Understand that data can be extrapolated to make predictions used in models of future climate change; ii) understand that these models have limitations.	Topic 6 – Immunity, Infection and Forensics – continued 6.7 – Understand the non-specific responses of the body to infection, including inflammation, lysozyme action, interferon and phagocytosis. 6.8 – Understand the roles of antigens and antibodies in the immune response, including plasma cells, macrophages and antigen-presenting cells. 6.9 – Understand the differences between the roles of B cells (B memory and B effector cells) and T cells (T helper, T killer and T memory cells) in the immune response.	• Global warming test • Natural selection and speciation test • End of Topic 6 test • Checkpoint questions (Topics 5 and 6) • A Level Paper 1: The Natural Environment and Species Survival (Topics 1–6) • A Level Paper 2: Energy, Exercise and Co-ordination (Topics 1–4, 7–8)

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	Big question: <i>How is climate change affecting living things, and how do we fight infection?</i> Learners evaluate the evidence for climate change, its causes and models, and its effects on organisms and enzymes. They study natural selection and speciation, and ways to reduce atmospheric carbon dioxide. Topic 6 finishes with the body's non-specific and specific immune responses.	5.15 – Understand the effects of climate change (changing rainfall patterns and seasonal cycles) on plants and animals (distribution of species, development and life cycles). 5.16 – Understand the effect of temperature on the rate of enzyme activity and its impact on plants, animals and microorganisms. 5.17 – Understand how evolution (a change in the allele frequency) can come about through gene mutation and natural selection. 5.18 – Understand the role of the scientific community (journals, peer review, conferences) in validating new evidence, including proteomics and genomics, that supports the theory of evolution. 5.19 – Understand how isolation reduces gene flow between populations, leading to allopatric or sympatric speciation. 5.20 – Understand how scientific conclusions about controversial issues, such as climate change, can sometimes depend on who is reaching the conclusions. 5.21 – Understand how knowledge of the carbon cycle can be applied to methods to reduce atmospheric levels of carbon dioxide. 5.22 – Understand how reforestation and the use of sustainable resources, including biofuels, are examples of the effective management of the conflict between human needs and conservation.	Key maths skills • use decimal and standard form, e.g. numbers of cells in an immune response Working scientifically • use models to explain the specific immune response • communicate the roles of B and T cells using correct terminology	• A Level Paper 3: General and Practical Applications in Biology (Topics 1–8) • Carbon cycle: evaluate biofuels and reforestation as sustainable solutions • Practical Endorsement (CPAC): core practicals recorded in lab books • In-class retrieval practice and exam questions • Homework activities
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		SUSTAINABILITY IN CONTEXT Once students can apply the carbon cycle to reducing atmospheric CO₂, they evaluate biofuels as a sustainable resource: • Apply: explain why biofuels are described as carbon neutral, and where this claim breaks down (fertiliser, machinery, transport, land clearance). • Evaluate: weigh biofuels and reforestation against food production and biodiversity, and decide which best manage the conflict between human needs and conservation. Working scientifically: recognise that conclusions on controversial issues can depend on who reaches them (5.20). Links: Year 12 photosynthesis and respiration; 5.10–5.11 productivity and energy transfer. Core Practical 12 – Investigate the effect of temperature on the initial rate of an enzyme-catalysed reaction, to include Q10. Core Practical 13 – Investigate the effects of temperature on the development of organisms (such as seedling growth rate, brine shrimp hatch rates). Key maths skills • use scatter diagrams to identify correlations in climate data		
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		- draw tangents to find initial rates and calculate Q10 (CP12) - use percentages and a statistical test for hatch rate data (CP13) Working scientifically - distinguish correlation from causation in climate evidence (5.12) - evaluate climate models and their limitations (5.14) - understand how peer review and the scientific community validate evidence (5.18) - control variables in temperature investigations (CP12, CP13)		
Spring Term 2A Year 13 (Jan – Feb)	Intent Why is this taught now? <i>Topic 7 builds on the ATP and energy ideas from photosynthesis to explain respiration and muscle contraction. Topic 8 builds on cell membranes and transport from Year 12 to explain how nerve impulses are generated and transmitted.</i>	Topic 7 – Run for Your Life 7.1 – Know how muscles, tendons, the skeleton and ligaments interact to enable movement, including antagonistic muscle pairs, extensors and flexors. 7.2 – Understand the contraction of skeletal muscle in terms of the sliding filament theory (actin, myosin, troponin, tropomyosin, Ca ²⁺ , ATP and ATPase). 7.10 – i) Know the structure of a muscle fibre. 7.3 – i) Understand the overall reaction of aerobic respiration; ii) understand that respiration is a many-stepped process, each step catalysed by a specific intracellular enzyme. 7.4 – Understand the roles of glycolysis in aerobic and anaerobic respiration. 7.5 – Understand the role of the link reaction and the Krebs cycle in the complete oxidation	Topic 8 – Grey Matter 8.1 – Know the structure and function of sensory, relay and motor neurones, including the role of Schwann cells and myelination. 8.2 – i) Understand how the nervous systems of organisms can cause effectors to respond to a stimulus; ii) understand how the pupil dilates and contracts. 8.3 – Understand how a nerve impulse (action potential) is conducted along an axon, including changes in membrane permeability and saltatory conduction. 8.4 – Know the structure and function of synapses in nerve impulse transmission, including neurotransmitters such as acetylcholine. 8.5 – Understand how rods in the retina detect stimuli, including rhodopsin, opsin, retinal, sodium ions, cation channels and hyperpolarisation.	- Card test on key GCSE terminology - Muscle test - Respiration test - Nerve impulse test - Photoreceptors test - Checkpoint questions (Topics 7 and 8) - A Level Paper 1: The Natural Environment and Species Survival (Topics 1–6) - A Level Paper 2: Energy, Exercise and Co-ordination (Topics 1–4, 7–8) - A Level Paper 3: General and
	Teacher A: Topic 7 – Run for Your Life Teacher B: Topic 8 – Grey Matter Big question: <i>Where does the energy for movement come from, and how do nerves carry messages?</i> Topic 7 compares sprinters and endurance athletes. Learners study			

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	how muscles and the skeleton produce movement, the sliding filament theory, and aerobic and anaerobic respiration. Topic 8 uses how we perceive the world as its context. Learners study neurones, reflexes, action potentials, synapses and how the eye detects light.	of glucose, and why these steps take place in the mitochondria. 7.6 – Understand how ATP is synthesised by oxidative phosphorylation associated with the electron transport chain, including chemiosmosis and ATP synthase. Core Practical 16 – Investigate rate of respiration. Key maths skills • change the subject of an equation and use appropriate units and significant figures (CP16) • calculate the volume of gas absorbed using the volume of a cylinder (CP16) Working scientifically • control variables and use living organisms safely and ethically (CP16) • use models to explain processes, e.g. the sliding filament theory	8.7 – Understand how co-ordination is brought about through nervous and hormonal control in animals. Key maths skills • use ratios, fractions and percentages • construct and interpret frequency tables, bar charts and histograms Working scientifically • communicate processes such as the action potential using correct terminology • compare nervous and hormonal coordination (8.7)	Practical Applications in Biology (Topics 1–8) • Practical Endorsement (CPAC): core practicals recorded in lab books • In-class retrieval practice and exam questions • Homework activities
Spring Term 2B Year 13 (Feb – Mar)	Intent Why is this taught now? <i>Once students understand respiration, they can explain how the heart and breathing are controlled to meet the demands of exercise. Topic 8 moves from single neurones to the whole brain, and how it develops and learns.</i> Teacher A: Topic 7 – Run for Your Life (completed)	Topic 7 – Run for Your Life – continued 7.7 – Understand what happens to lactate after a period of anaerobic respiration in animals. 7.8 – i) Know the myogenic nature of cardiac muscle; ii) understand how the SAN, AVN, bundle of His and Purkyne fibres coordinate the heartbeat; iii) understand how ECGs aid the diagnosis of cardiovascular disease. 7.9 – i) Be able to calculate cardiac output; ii) understand how variations in ventilation and cardiac output are controlled, including the	Topic 8 – Grey Matter – continued 8.6 – Understand how phytochrome and IAA bring about responses in plants to environmental cues, including their effects on transcription. 8.8 – Know the location and functions of the cerebral hemispheres, hypothalamus, cerebellum and medulla oblongata. 8.9 – Understand how MRI, fMRI, PET and CT scans are used in medical diagnosis and the investigation of brain structure and function. 8.14 – Understand how imbalances in naturally occurring brain chemicals can	• Control of heart rate test • Control of breathing rate test • Temperature regulation test • Checkpoint questions (Topics 7 and 8) • A Level Paper 1: The Natural Environment and

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	Teacher B: Topic 8 – Grey Matter (continued) Big question: <i>How does the body keep up with exercise, and how does the brain develop?</i> Learners study the control of heart rate and breathing, ECGs, muscle fibre types, and homeostasis and thermoregulation. They consider the effects of too much and too little exercise, medical technology in sport, and performance-enhancing substances. In Topic 8 they study plant responses, brain structure, brain imaging, visual development, nature and nurture, habituation and the use of animals in research.	cardiovascular control centre and ventilation centre in the medulla oblongata. 7.10 – ii) Understand the structural and physiological differences between fast and slow twitch muscle fibres. 7.11 – i) Understand what is meant by negative feedback and positive feedback control; ii) understand the principle of negative feedback in maintaining systems within narrow limits. 7.12 – Understand homeostasis and its importance during exercise, including the role of the hypothalamus and the mechanisms of thermoregulation. 7.13 – Understand the analysis and interpretation of data relating to the disadvantages of exercising too much and too little, recognising correlation and causal relationships. 7.14 – Understand how medical technology, including keyhole surgery and prostheses, is enabling those with injuries and disabilities to participate in sports. 7.15 – Be able to discuss different ethical positions on whether the use of performance-enhancing substances by athletes is acceptable. 7.16 – Understand how genes can be switched on and off by DNA transcription factors, including hormones. Core Practical 17 – Investigate the effects of exercise on tidal volume, breathing rate, respiratory minute ventilation and oxygen	contribute to ill health (dopamine in Parkinson’s disease, serotonin in depression) and to the development of new drugs. 8.15 – Understand the effects of drugs on synaptic transmission, including L-Dopa and MDMA. 8.10 – Understand what happens during the critical period so that mammals can develop their visual capacities to the full. 8.11 – Understand the role animal models have played in research into human brain development and function, including Hubel and Wiesel’s experiments. 8.12 – Be able to discuss moral and ethical issues relating to the use of animals in medical research from two ethical standpoints. 8.13 – Understand how animals, including humans, can learn by habituation. 8.19 – Understand the methods used to investigate the contributions of nature and nurture to brain development. Core Practical 18 – Investigate habituation to a stimulus. Key maths skills • use a statistical test and percentages to analyse habituation data (CP18)	Species Survival (Topics 1–6) • A Level Paper 2: Energy, Exercise and Co-ordination (Topics 1–4, 7–8) • A Level Paper 3: General and Practical Applications in Biology (Topics 1–8) • Practical Endorsement (CPAC): core practicals recorded in lab books • In-class retrieval practice and exam questions • Homework activities
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		consumption using data from spirometer traces. Key maths skills • calculate cardiac output (stroke volume × heart rate) and rearrange the equation • calculate tidal volume, breathing rate, minute ventilation and oxygen consumption from spirometer traces (CP17) • construct and interpret frequency tables, bar charts and histograms Working scientifically • analyse data on exercise, recognising correlation and causal relationships (7.13) • discuss ethical positions on performance-enhancing substances (7.15)	Working scientifically • discuss the ethics of animal research from two ethical standpoints (8.12) • evaluate methods used to study nature and nurture, e.g. twin studies (8.19) • use living organisms ethically (CP18)	
Summer Term 3A Year 13 (Apr – May)	Intent Why is this taught now? <i>Topic 8 finishes by returning to synapses to explain how drugs work, then looks at genome sequencing and genetic modification. This draws together ideas from across the course before revision and the A Level examinations.</i> Teacher A: Revision (Topics 1–8) Teacher B: Topic 8 – Grey Matter (completed), then revision Big question: <i>How can our understanding of genes and the brain improve medicine?</i>	Revision Targeted revision of Topics 1–8 and exam technique for Papers 1–3.	Topic 8 – Grey Matter – completed 8.16 – Understand how genome sequencing projects are being used to develop personalised medicine, and the social, moral and ethical issues this raises. 8.17 – Know how drugs can be produced using genetically modified organisms (plants, animals and microorganisms). 8.18 – Understand the risks and benefits associated with the use of genetically modified organisms. Key maths skills • use ratios, fractions and percentages to interpret data on drug effects	• End of Topic 8 test • Past-paper practice for Papers 1–3 • A Level Paper 1: The Natural Environment and Species Survival (Topics 1–6) • A Level Paper 2: Energy, Exercise and Co-ordination (Topics 1–4, 7–8) • A Level Paper 3: General and Practical Applications in Biology (Topics 1–8)

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	Learners study how imbalances in brain chemicals cause ill health, how drugs affect synapses, personalised medicine and the uses of genetically modified organisms. They then revise Topics 1–8 before the A Level examinations begin.		Working scientifically - consider the social, moral and ethical issues of personalised medicine (8.16) - evaluate the risks and benefits of genetically modified organisms (8.18) Revision Targeted revision of Topics 1–8.	- In-class retrieval practice and exam questions - Homework activities
		A Level examinations begin	A Level examinations begin	
Summer Term 3B Year 13 (Jun – Jul)	Intent Why is this taught now? <i>The course is complete and students sit their final examinations.</i>	A Level examinations continue (study leave)	A Level examinations continue (study leave)	- A Level Paper 1: The Natural Environment and Species Survival (Topics 1–6) - A Level Paper 2: Energy, Exercise and Co-ordination (Topics 1–4, 7–8) - A Level Paper 3: General and Practical Applications in Biology (Topics 1–8)
	Teacher A: A Level examinations and study leave Teacher B: A Level examinations and study leave Year 13 are on study leave and sit their A Level Biology examinations.			