

Beths Grammar School KS4 (Biology) Curriculum Map – Year 11

How to read this map: each row is one half-term (teaching weeks shown under the term). **Intent** – what students learn and why it comes at this point. **Implementation** – OCR specification statements taught, with linked skills. **Impact** – how progress is checked. **PAG** = Practical Activity Group – the core practical for each unit. **HT** = Higher tier only. **Key:** **Green shading** = sustainability in context (Spring 2A). **Big question** = a conversation starter for home. **Key maths skills (M)** and **Working scientifically (WS)** = OCR skill codes linked to the statements taught.

Term	INTENT	IMPLEMENTATION	IMPACT
GCSE OCR Biology A Gateway Science Suite	Substantive Knowledge This is the specific, factual content for the topic, which should be connected into a careful sequence of learning.	Disciplinary Knowledge (Skills) This is the action taken within a particular topic in order to gain substantive knowledge.	Assessment opportunities What assessments will be used to measure student progress? Evidence of how well students have learned the intended content.
Autumn Term 1A Year 11 Weeks 1–8 (Sept – Oct)	Intent Why is this taught now? <i>Inheritance builds on DNA and protein synthesis (B1.2) and cell division (B2.1) from earlier years. It gives students the genetics they need to understand natural selection and evolution next.</i> B5.1 – Inheritance Big question: <i>Why do we look like our parents, but not exactly?</i> From KS3 Science, learners should be familiar with heredity as the process by which genetic information is passed from one generation to the next, and have a simple model of chromosomes, genes and DNA. They will build on this and learn that inheritance relies on the genome being passed on, sexually or asexually, and that an organism's characteristics are influenced by its genome and its interaction with the environment.	<i>If B4 has overlapped into Year 11 because of timetabling, it is finished at the start of this half term.</i> B5.1 – Inheritance B5.1a – Explain the terms gamete, chromosome, gene, allele/variant, dominant, recessive, homozygous, heterozygous, genotype and phenotype. B5.1b – Describe the genome as the entire genetic material of an organism. B5.1c – Describe that the genome, and its interaction with the environment, influence the development of the phenotype of an organism. B5.1d – Recall that all variants arise from mutations, and that most have no effect on the phenotype, some influence phenotype and a very few determine phenotype. B5.1e – Describe how genetic variants may influence phenotype: in coding DNA by altering the activity of a protein, and in non-coding DNA by altering how genes are expressed. (HT) B5.1f – Explain some of the advantages and disadvantages of asexual and sexual reproduction in a range of organisms. B5.1g – Explain the terms haploid and diploid. B5.1h – Explain the role of meiotic cell division in halving the chromosome number to form gametes. B5.1i – Explain single gene inheritance. B5.1j – Predict the results of single gene crosses.	• B5.1 Assessment • Year 11 trial exams • GCSE examinations • In-class formative assessment activities e.g. recall • Homework activities

Beths Grammar School KS4 (Biology) Curriculum Map – Year 11

		B5.1k – Describe sex determination in humans using a genetic cross. B5.1l – Recall that most phenotypic features are the result of multiple genes rather than single gene inheritance. B5.1m – Describe the development of our understanding of genetics. Key maths skills M1c – use direct proportions and simple ratios in genetic crosses M2e – use probability to predict the outcome of genetic crosses M2c / M4a – extract and interpret information from Punnett squares, charts and tables Working scientifically WS1.1a – how our understanding of genetics has developed over time, e.g. Mendel (B5.1m) WS1.1d / WS1.1f – discuss ethical issues and implications of developments in genetics WS1.1i – the importance of peer review and communicating results	
Autumn Term 1B Year 11 Weeks 9–15 (Nov – Dec)	Intent Why is this taught now? <i>Natural selection uses the variation and inheritance from B5.1 to explain how species change over time. B6.1 then applies ideas from B4 and B5 to monitoring and protecting biodiversity.</i> B5.2 – Natural Selection and Evolution and B6.1 – Monitoring and Maintaining the Environment Big question: <i>How has life on Earth changed, and how can we protect it?</i> Learners should appreciate that changes in the environment can leave some individuals, or even entire species, unable to compete and reproduce, leading to extinction. They will learn that variation and environmental change drive natural	B5.2 – Natural Selection and Evolution B5.2a – State that there is usually extensive genetic variation within a population of a species. B5.2b – Describe the impact of developments in biology on classification systems. B5.2c – Explain how evolution occurs through the natural selection of variants that have given rise to phenotypes best suited to their environment. B5.2d – Describe evolution as a change in the inherited characteristics of a population over time, through a process of natural selection, which may result in the formation of new species. B5.2e – Describe the evidence for evolution. B5.2f – Describe the work of Darwin and Wallace in the development of the theory of evolution by natural selection and explain the impact of these ideas on modern biology. Year 11 trial exams	• Year 11 trial exams • B5 Assessment • GCSE examinations • In-class formative assessment activities e.g. recall • Homework activities

Beths Grammar School KS4 (Biology) Curriculum Map – Year 11

	selection, and that evolution accounts for biodiversity and how organisms are related. After the trial exams, B6.1 builds on B4: learners study how we sample and monitor the environment, how humans affect biodiversity, and what we can do to maintain it.	B6.1 – Monitoring and Maintaining the Environment B6.1a – Explain how to carry out a field investigation into the distribution and abundance of organisms in a habitat and how to determine their numbers in a given area. B6.1b – Describe both positive and negative human interactions within ecosystems and explain their impact on biodiversity. B6.1c – Explain some of the benefits and challenges of maintaining local and global biodiversity. B6.1d – Evaluate the evidence for the impact of environmental changes on the distribution of organisms, with reference to water and atmospheric gases. (HT) Core practical: PAG B3 – Sampling techniques Use sampling techniques such as quadrats and transects to investigate the distribution and abundance of organisms in a habitat, including biotic and abiotic factors. Key maths skills M2b – calculate arithmetic means from sampling data M2d – understand the principles of sampling as applied to scientific data M4a / M4c – plot graphs, selecting appropriate scales for the axes M1c / M2c – use percentiles and interpret charts, graphs and tables M3a – use the symbols =, <, <<, >>, >, α, ~ in answers (B6.1a) Working scientifically WS1.1b – use models to explain classification (B5.2b) WS1.1a / WS1.1c / WS1.1g – evaluate evidence for evolution and the work of Darwin and Wallace WS1.2b–e – plan a field investigation, choose apparatus and representative sampling methods, and evaluate them WS1.3h – identify sources of random and systematic error WS2a–d – carry out experiments safely, record and present observations, and communicate findings (ecological sampling with quadrats and transects)	
--	--	--	--

Beths Grammar School KS4 (Biology) Curriculum Map – Year 11

Spring Term 2A Year 11 Weeks 16–21 (Jan – Feb) Sustainability in agricultural solutions lesson	Intent Why is this taught now? <i>Feeding the human race draws together photosynthesis (B1), ecosystems (B4) and genetics (B5) to tackle a global challenge. The agricultural solutions lesson is extended to explore sustainability (see Implementation).</i> B6.2 – Feeding the Human Race and B6.3 – Monitoring and Maintaining Health (begins) <i>Big question: How can we feed a growing world population sustainably?</i> Learners should be familiar with a healthy human diet and the consequences of imbalances in it. B6.2 draws together knowledge from B1, B4 and B5: DNA, what plants need to photosynthesise, interactions between species, and variation and selection. Learners will explore how biologists are tackling the need for more food for a growing population, including the debate around gene technology. B6.3 begins after the core trial exams.	B6.2 – Feeding the Human Race B6.2a – Describe some of the biological factors affecting levels of food security. B6.2b – Describe and explain some possible agricultural solutions to the demands of the growing human population. B6.2c – Explain the impact of the selective breeding of food plants and domesticated animals. B6.2d – Describe genetic engineering as a process which involves modifying the genome of an organism to introduce desirable characteristics. B6.2e – Describe the main steps in the process of genetic engineering. (HT) B6.2f – Explain some of the possible benefits and risks of using gene technology in modern agriculture. B6.2g – Describe and explain some possible biotechnological solutions to the demands of the growing human population. B6.3 – begins B6.3a – Describe the relationship between health and disease. B6.3b – Describe different types of diseases. Key maths skills M2b / M2f – use means, mode and median to describe food security data M1c / M2c / M4a – interpret data on selective breeding and GM crops Working scientifically WS1.1c / WS1.1d – the power and limitations of science, and ethical issues in gene technology WS1.1e–h – applications, implications, decision-making and risks of gene technology in agriculture WS1.3i – communicate reasoned conclusions	• B6.2 Assessment • Core trial exams • GCSE examinations • In-class formative assessment activities e.g. recall • Homework activities
---	--	---	---

Beths Grammar School KS4 (Biology) Curriculum Map – Year 11

		SUSTAINABILITY IN CONTEXT – extension of the B6.2b agricultural solutions lesson Once students can describe hydroponics, biological control, gene technology, fertilisers and pesticides, they judge how sustainable each one is: • Apply: explain how each solution increases food production. • Evaluate: weigh higher yields against effects on biodiversity, water and energy use, and cost, and decide which solutions best meet food security in the long term. Working scientifically: WS1.1c – power and limitations of science; WS1.1f – evaluate social, economic and environmental implications. Links: Year 9 limiting factors (B1.4) and Year 10 carbon cycle (B4.1).	
Spring Term 2B Year 11 Weeks 22–26 (Feb – Mar)	Intent Why is this taught now? <i>Builds on B6.2 by moving from the health of crops to the health of people. It uses cells (B1), transport (B2) and genetics (B5) to explain how disease spreads and how the body defends itself.</i> B6.3 – Monitoring and Maintaining Health (continued) Big question: <i>How do we fight disease?</i> Learners should be familiar with the effects of recreational drugs, the impact of exercise, asthma and smoking on the gas exchange system, and the consequences of imbalances in the diet. They will learn how communicable diseases spread in humans and plants, how the body and plants defend themselves, and how vaccines, medicines and monoclonal antibodies help us prevent and treat disease.	B6.3 – continued B6.3c – Describe the interactions between different types of disease. B6.3d – Explain how communicable diseases (caused by viruses, bacteria, protists and fungi) are spread in animals and plants. B6.3e – Explain how the spread of communicable diseases may be reduced or prevented in animals and plants. B6.3f – Describe a minimum of one common human infection, one plant disease and sexually transmitted infections in humans including HIV/AIDS. B6.3g – Describe physical plant defence responses to disease. B6.3h – Describe chemical plant defence responses. B6.3i – Describe different ways plant diseases can be detected and identified, in the lab and in the field. (HT) B6.3j – Explain how white blood cells and platelets are adapted to their defence functions in the blood. B6.3k – Describe the non-specific defence systems of the human body against pathogens. B6.3l – Explain the role of the immune system of the human body in defence against disease. B6.3m – Describe how monoclonal antibodies are produced. (HT)	• GCSE examinations • In-class formative assessment activities e.g. recall • Homework activities

Beths Grammar School KS4 (Biology) Curriculum Map – Year 11

		B6.3n – Describe some of the ways in which monoclonal antibodies can be used. (HT) B6.3o – Explain the use of vaccines and medicines in the prevention and treatment of disease. B6.3p – Explain the aseptic techniques used in culturing organisms. B6.3q – Describe the processes of discovery and development of potential new medicines. Core practical: PAG B7 – Microbiological techniques Use aseptic techniques to culture bacteria and investigate the effectiveness of antimicrobial agents on the growth of a bacterial lawn. Key maths skills M2c / M2g – interpret data and scatter diagrams on the spread of disease M4a – translate information between graphical and numerical forms M2d – understand the principles of sampling in clinical trials M3d / M5c – calculate areas of bacterial cultures and clear zones using πr^2 Working scientifically WS1.4b – use scientific quantities, e.g. numbers of pathogens and infected cases WS1.1d / WS1.1g / WS1.1h – discuss ethics, make decisions and evaluate risks, e.g. vaccination and new medicines WS1.2c – select apparatus and aseptic techniques WS2a–d – carry out experiments safely, record and present observations, and communicate findings (PAG B7)	
Summer Term 3A Year 11	Intent Why is this taught now? <i>Non-communicable disease completes the course by linking lifestyle choices and new medical technologies. Revision then brings</i>	B6.3 – to be finished. B6.3r – Recall that many non-communicable human diseases are caused by the interaction of a number of factors. B6.3s – Evaluate some different treatments for cardiovascular disease.	• B6 Assessment • GCSE examinations

Beths Grammar School KS4 (Biology) Curriculum Map – Year 11

Weeks 27–33 (Apr – May)	<i>all six topics together before the GCSE examinations.</i> B6.3 – Monitoring and Maintaining Health (completed), Revision and GCSE Examinations Big question: <i>How do our lifestyle choices affect our health?</i> Learners complete B6.3 by studying non-communicable diseases, the lifestyle factors that affect them, and new medical technologies such as stem cells and gene technology. B6 is then assessed and learners move into revision before the GCSE examinations.	B6.3t – Analyse the effect of lifestyle factors on the incidence of non-communicable diseases at local, national and global levels. B6.3u – Describe cancer as the result of changes in cells that lead to uncontrolled growth and division. B6.3v – Discuss potential benefits and risks associated with the use of stem cells in medicine. B6.3w – Explain some of the possible benefits and risks of using gene technology in medicine. B6.3x – Discuss the potential importance for medicine of our increasing understanding of the human genome. Key maths skills M2c / M2d / M4a – analyse data on lifestyle factors and disease M2g – use scatter diagrams to identify correlations, e.g. in treatments for cardiovascular disease Working scientifically WS1.1c–h – discuss the benefits, risks and ethics of stem cells, gene technology and genome research in medicine Revision Targeted revision of Topics B1–B6. GCSE examinations begin	• In-class formative assessment activities e.g. recall • Homework activities
Summer Term 3B Year 11 Weeks 34–40 (Jun – Jul)	Intent Why is this taught now? <i>The course is complete and students sit their final examinations.</i> GCSE Examinations Learners sit their GCSE Biology examinations. The course is complete.	GCSE examinations continue	• GCSE examinations