Year 11 Overview 2024-25 – *Biology*

Date	Wk	Week	Units Studied & Learning Outcomes	Key Concepts & Assessment
8 weeks (8/9 Lessons) (38Days)				
2-Sep	A	1	• <u>Overview of Unit/No. lessons</u> 1) Causes of variation (1 lesson) 2) Types of reproduction (1 lesson) 3) Advantages and disadvantages of different reproduction strategies (1 lesson) 4) DNA, Chromosomes and the human genome (1-2 lessons) 5) Alleles and predicting patterns of inheritance (Punnett squares/genetic diagrams) (1-2 lessons) 6) The understanding of inheritance - the work of Mendel (1-2 lesson) 7) Inherited disorders (1 lesson) 8) Sex determination (1 lesson) 9) Revision Recall of knowledge, application of knowledge, interpret information, analyse results, carry out practical procedures, write practical methods, write word & chemical equations **Prior (KS3):** Year 7- Cells and Reproduction topics **Current (KS4):** Linking chromosomes with chemical they are made out of and how it functions Links with work about adaptations **Next (KS5):** Year 12 – Monomers and polymers DNA & RNA DNA & Protein synthesis Mutations during Meiosis Diversity & taxonomy GW: Can state characteristics of the DNA molecule and understand that it is a 'code'. Can identify what an allele and recognise different types of reproduction. Can complete a genetic diagram and identify probabilities BI: Can recall the base pairing rule and describe the DNA molecule in greater detail. Can define what an allele is and recognise key terms to describe pairs of alleles. Can interpret family trees. Can state some pros/cons of embryo screening. Can recognise the importance of the human genome project. EW: Can describe the importance of the human genome. Can construct arguments for and against embryo screening, with reasons. Can interpret and explain family tree diagrams linked to genetic disorders. Can confidently use key terminology when describing alleles.	**Foundational Concepts** Ecology **Outcomes:** • Understand and describe the structure of DNA • Identify inherited disorders, understand their cause and describe their effects. Describe genetic screening. • Identify different types of reproduction • Understand the process of meiosis • Understand sex determination • *13/11-19/11 Transgender awareness week* Understand the process of evolution • Understand the issues surrounding food security and over-fishing • Understand the role of biotechnology in food production. **Tier 2/3 Vocabulary** • Glossaries, quick quizzes, within exam questions, PowerPoints. **KW**: Variation, Allele, dominant, recessive, chromosome, Double Helix, genome, polydactyly, Cystic fibrosis, meiosis **EDI-** • Inherited characteristics linked to diversity and race. • Genetic disorders – physical differences between individuals as a result of inherited genes. • Genetic screening – links to ethics associated with elimination of genetic disorders from families • Charles Darwin – developed theories that were not aligned with the popular theory of Creationism. • Gregor Mendel- Came from a poor family but to gain an education, became a monk to develop his understanding of inherited characteristics. • Rosalind Franklin – Female scientist who helped developed the understanding of the structure of DNA, though did not win the Nobel Prize (Watson, Crick and Wilkins jointly received it – all males). **Links to root words (etymology):** • Allele comes from the Ancient Greek *'allos'* - other. Chromosome comes from the Greek words *'khroma'* - colour and 'zoma' -body. They were given this term as they are easily stained by some dyes used in research. • Polydactyly comes from the Greek words '*polu'* meaning 'many' and '*daktulos'* meaning 'fingers' • Meiosis comes from the Greek 'Meion' meaning less **History and culture**: • In 1869, Friedrich Miescher isolated "nuclein," DNA with associated proteins, from cell nuclei. He was the first to identify DNA as a distinct molecule.
9-Sep	B	2		
16-Sep*	A	3		
23-Sep	B	4		
30-Sep	A	5		
7-Oct	B	ST2		
14-Oct	A	ST2		
21-Oct	B	ST2		

				• The process of meiosis was first described in the mid-1870s by Oscar Hertwig, who observed it while working with sea urchin eggs. • Development of theories of evolution, Darwin's journey on HMS Beagle, historical/religious context & implications of Darwin/Wallace's NS theory • In 1859, Charles Darwin set out his theory of evolution by natural selection as an explanation for adaptation and speciation. He defined natural selection as the "principle by which each slight variation [of a trait], if useful, is preserved" **Misconceptions** • Evolution – that evolution Is about small changes over periods of time, not one large change • That humans evolved from monkeys – students need to develop a greater understanding of common ancestors and interpreting genetic diagrams. **Careers:** geneticist, biotechnologist, epidemiologist, forensic scientist, genetic engineer, research scientist, healthcare scientists – genomics, genetic counsellor.
Half-Term			**7** weeks (10/11 lessons for combined) (35 Days)	
4-Nov	A	9	ST2 FEEDBACK 9) Meiosis (1 lesson) 10) Evolution (1 lesson) 11/12) Theories of evolution (1 lesson) 13) Growing bacteria aseptically and testing antiseptics (1 lesson)- REQUIRED PRAC 14) Speciation (1 lesson) 15) Extinction (1 lesson) 16) Fossil formation (1 lesson) 17) Selective breeding (1 lesson) 18) Genetic engineering (1 lesson) 19) Classification (1 lesson) 20/21) Cloning (1-2 lessons) 22/23) Ecosystems and biodiversity (2 lessons) 24) Biotic and Abiotic factors (1 lesson) 25) Animal adaptations (1 lesson) **Prior**: Year 7 – Plant & animal reproduction; Year 7 – classification; Year 7 Gametes & fertilisation; Year 7 DNA & inheritance **Current**: Genetic engineering; Cloning; Evolution; Extinction **Next**: Year 12 – genetics & inheritance; DNA & RNA; Diversity & Taxonomy; Adaptations GW: Identify reasons why organisms can become extinct and state different ways in which fossils can be formed. Identify steps in selective breeding & genetic engineering. State reasons why scientists classify living things.	**Foundational concepts:** Genetics, variation & evolution **Outcomes:** • Understand the process of selective breeding • Understand the process of genetic engineering • Understand classification describing classification systems • Understand the process of cloning and its applications – linking back to therapeutic cloning **KW**: Evolution, fossil, bacteria, microorganism, antibiotic, inhibition, speciation, extinction, mineralisation, cloning, genetic engineering, classification, kingdom, phylum, genus, species **Tier 2/3 Vocabulary** • Glossaries, quick quizzes, within exam questions, PowerPoints. **EDI-** • Genetic engineering – Use of bacteria to produce human insulin for the treatment of diabetes. • Food security – different parts of the world • GE rice, vitamin A – developing food with greater nutritional content – potentially could be used in more deprived areas of the world. **Links to root words (etymology):** • Phylum – From the Greek 'phylon' – meaning tribe • Genus – From the Latin meaning race, stock • Species – From the Latin 'specere' – to look, appearance, beauty **History and culture**: • Classification – new species are regularly discovered and Linnaean classification is still used – often binominal names include reference to well-known people e.g *Platysaurus attenboroughi* • Selective breeding – the earliest evidence of artificial selection of plants dates back to 7800 BCE in
11-Nov	B	10		
18-Nov	A	11		
25-Nov	B	12		
2-Dec	A	13		
9-Dec	B	14		
16-Dec	A	15		

			BI: Understand why there are gaps in the fossil record. Explain the different ways that living things can become extinct. Describe the process of selective breeding & genetic engineering. Identify different ways of classifying organisms. EW: Explain how fossils support Darwin's theory of Natural selection. Link conservation and biodiversity to prevention of extinction of species. Explain the process of genetic engineering and selective breeding. Explain how species can be classified and why classification systems have changed. Recall of knowledge, application of knowledge, interpret information, analyse results, carry out practical procedures, write practical methods, write word & chemical equations **Assessment:** • Quick quiz • Exam style questions • Q&A • Interleaving • Practical skills • Data analysis • Graph skills • Interpretation & evaluation skills Recall of knowledge, application of knowledge, interpret information, analyse results, carry out practical procedures, write practical methods, write word & chemical equations **Assessment:** • Quick quiz • Exam style questions • Q&A • Interleaving • Practical skills • Data analysis • Graph skills • Interpretation & evaluation skills	archaeological sites found in southwest Asia, where scientists have found domestic varieties of wheat • Genetic engineering - 1973: Biochemists Herbert Boyer and Stanley Cohen develop genetic engineering by inserting DNA from one bacteria into another. • Cloning – Dolly the sheep was the first mammal to be cloned from an adult body cell at the Roslin Institute in Scotland 1996. **Careers:** geneticist, biotechnologist, epidemiologist, forensic scientist, genetic engineer, research scientist **Misconceptions** Cloning – is a straightforward process and is successful every time. That the clone is an exact copy in every way – rather than considering environmental variation and lived experiences. Fossils – that fossils are just bones rather than undergoing mineralisation.
Christmas Holiday			6 weeks (8/9 lessons for combined) (30 Days)	
6-Jan	B	16	26) Plant adaptations (1 lesson) 27) Extremophiles (1 lesson) 28) Competition for resources (1 lesson) 29) Organisation of an ecosystem (Food chains and webs) (1 lesson) 30-31) Pyramids of biomass and trophic levels (2 lessons) (32-33) Field investigation REQUIRED PRACTICAL (2 lessons) 34)Predator prey cycles (1 lesson) 35)The Carbon cycle (1 lesson) 36) Decay and decomposition (1 lesson) 37-38) Decay in milk REQUIRED PRACTICAL (2 lessons)	**Foundational Concepts** Ecology **Outcomes:** • Understanding Ecosystems and factors that affect them. • Describe Biotic and Abiotic factors and their effects. • Understand how to interpret food chains and food webs and the role of interference. • Understand predator prey cycles • Understand the role and processes of the carbon cycle • Understand the process of the water cycle
13-Jan	A	17		
20-Jan	B	ST3		
27-Jan	A	ST3		
3-Feb	B	ST3		
10-Feb	A	21		

			39) Deforestation and peat bog destruction (1 lesson) - Revision (These lessons can be placed anywhere within this sequence of lessons) **Prior:** Yr 8- Photosynthesis, Food chains and webs and Biodiversity **Current:** Understand Ecosystems and factors that affect them **Next:** Year 12 – Adaptation, diversity and taxonomy. Biomass and productivity	• Understand the role of Trophic levels in an ecosystem • Understand pyramids of biomass and how energy is lost or transferred within an ecosystem. **History:** **Food chains** were first introduced by the Arab scientist and philosopher Al-Jahiz in the 10th century and later popularized in a book published in 1927 by Charles Elton, which also introduced the **food web** concept. **Root words (etymology):** • Abiotic – from the Greek 'a' – without and 'biotikos' - pertaining to life • Extremophile – from the latin 'extremus' – extreme and the Greek 'philia' – love • Epiphyte – from Greek 'epi' – upon and 'phyton' meaning plant – refers to the non-parasitic growth of epiphyte plants on the branches and trunks of other species • Biodiversity – from the Greek 'bios' – life and Latin 'Diversitas' - variety *LGBT+ History month* *27/1 Holocaust memorial day* *1/2 World Hijab Day* *6/2-12/2 Children's mental health week.* *7/2 Safer internet day* *10/2 Chinese New Year*
Half-Term			6 weeks (8/9 lessons for combined) (29 Days)	
25-Feb	B	22	INSET 24th Feb 40) Air pollution and global warming (1 lesson) 41) The water cycle (1 lesson) 42-43) Land and water pollution (2 lessons) 44) Quorn production and sustainable food production (1 lesson) 45) Food security and over-fishing (1 lesson) 46) GCSE Exam preparation – Cells and organisation 47) GCSE Exam preparation – Digestive system and enzymes 48) GCSE Exam preparation – Breathing system, gas exchange and respiration 49) GCSE Exam preparation - Photosynthesis 50) GCSE Exam preparation – Hormones and the Nervous system	• Describe the cause and impact of acid rain • Understand the greenhouse effect and global warming • Explain the impact of deforestation on the environment • Describe how a body of water undergoes eutrophication • Evaluate the link between population increase and pollution • Understand factors affecting decay and decomposition • Carry out a required practical to measure decay • Understand the issues surrounding food security and over-fishing • Understand the role of biotechnology in food production. **Tier 2/3 Vocabulary** • Glossaries, quick quizzes, within exam questions, PowerPoints. **KW**: Ecosystem, Biodiversity, Population, Community, Habitat, Interdependence, stability, extremophile, eutrophication, precipitation, percolation, adapted, succulent, Epiphyte, Apex predator, Carbon sink Detritivore, decomposer **EDI**- Links to population increase, birth, death rate and medical facilities in developing countries. Links to sustainable food production in developed and developing countries Greta Thunberg – Autistic climate change activist, known for challenging world leaders at a young age about the effects of climate change.
3-Mar	A	23		
10-Mar	B	24		
17-Mar	A	25		
24-Mar	B	26		
31-Mar	A	27		

				George Washington Carver – a prominent Black scientist of early 20th century who worked on Ecology. Emmanuel Dongala – worked on a environmental toxicology and was refuge from the Republic of Congo, moving to the USA as a result of war. Rachel Carson – wrote *Silent spring* to bring attention to the harm that pesticide contamination has on ecosystems **Careers**: Conservation volunteer, park ranger, Environmental Impact assessment officer, Zoo worker, Ecologist, wildlife specialist **History: Food chains** were first introduced by the Arab scientist and philosopher Al-Jahiz in the 10th century and later popularized in a book published in 1927 by Charles Elton, which also introduced the **food web** concept. **Root words (etymology)** • Eutrophication - From the Greek *Eutrophos* meaning 'well nourished' • Percolation – From the Latin *percolatus* meaning 'to strain through' • Precipitation – From the Latin *praecipitare* meaning to 'throw down' **Misconceptions** • Carbon cycle – students may think it the 'carbon dioxide cycle' and focus on transfer of CO_2 between organisms. Some don't recognise that Carbon is incorporated into other compounds as it passes round. • Water cycle – Some students think that transpiration returns water to the ground as droplets from the stomata rather than evaporation back into the atmosphere • Global warming – difference between regional and global temperature changes • Incorrect representation of food chains and webs – in particular, the **direction** of arrows. *Women's history month* *Ramadhan begins 1/3* *21/3 World Down Syndrome day* *31/3 Transgender day of visibility*
Easter Holiday			5 weeks (?? lessons) (23 Days)	
22-Apr	B	28	Easter Monday 21st Early May bank hol 6/5	• ***Equality Diversity and Inclusion (EDI) links?*** *Good Friday 18/4* *Easter Sunday 20/4* *Autism and stress awareness month.* *25/4 World Malaria Day* *26/4 Lesbian visibility day* *UK national walking month.* *1/5-7/5 Deaf awareness week* *23/05 Vesak*
28-Apr	A	29		
5-May	B	30		
12-May	A	GCSE		
19-May	B	GCSE		
Half-Term			7 weeks (?? lessons) (34 Days)	
2-Jun	A	33	SJBF INSET 4/7	• ***Equality Diversity and Inclusion (EDI) links?*** *LGBTQ+ pride month.* *Gypsy, Roma and Traveller history month.* *12/6 world day against child labour* *18/6 autistic pride day* *20/6 World refugee day*
9-Jun	B	34		
16-Jun	A	35		
23-Jun	B	36		
30-Jun	A	37		
7-Jul	B	38		

14-Jul	A	39		
(Total: 189 Days)				

Overview of Year 11	
Based on your Flight Path *(E.g. Targets 1L – 4L)*	**By the end of Year 11, students will have learned**
GW:	• GW: Describe biodiversity, including some biodiverse habitats, Define biotic and abiotic factors, describe three types of adaptation, describe what plants need to survive, identify extreme environments, identify resources that animal need for survival, Identify producers, consumers in a food web, Identify the gases that pollute the air that contribute to global warming and acid rain, Be able to define the term 'deforestation' and know what a peat bog is, Identify ways in which land and water can be polluted with chemicals, Know that carbon is <u>one example</u> of a substance that is <u>recycled</u> in the environment, State what the word variation means , Give reasons why living things reproduce and name the different, Describe how the genetic material in a cell is arranged, Recall how genes are inherited and how they work, Identify which chromosomes are involved in the inheritance of sex, Recall that alleles can be recessive/dominant and state basic symptoms of genetic disorders. Complete genetic diagrams to calculate probabilities, Compare infectious and inherited diseases with named examples, Identify the method by which gametes are formed and compare ways in which new cells are produced, : State what is meant by the word EVOLUTION, Define what selective breeding is, Define the terms 'extinct' and 'endangered', Describe what classification is, how it is used in Biology and why it is important, Compare infectious and inherited diseases with named examples, Identify the method by which gametes are formed and compare ways in which new cells are produced, : State what is meant by the word EVOLUTION, Define what selective breeding is, Define the terms 'extinct' and 'endangered', Describe what classification is, how it is used in Biology and why it is important.
BI:	• Explain the importance of biodiversity, Explain how they affect organisms with in an ecosystem, explain how animals can be adapted, explain how plants can be adapted, explain how bacteria are adapted to deep sea vents, You can suggest strategies that animals can use to allow them to obtain resources for survival, Explain interdependent relationships, Describe how acid rain is formed and how global warming occurs and give reasons why the levels of each gas has changed, Discuss the reasons why peat bogs and rainforest habitats are under threat, Be able to explain the process of bioaccumulation and the effects upon a food chain. State AND name the main stages of the **carbon cycle,** Identify two causes of variation between living things, Describe key differences between the types of reproduction, State the importance of the genetic material, its arrangement and how it works, Make predictions and calculate the probability of inheriting certain characteristics, State which parent determines the sex of the baby, You can describe symptoms of specific inherited diseases and explain how they are inherited, Outline differences between the types of cell division, Describe theories put forward to explain evolution and name scientists involved, Describe how selective breeding is carried out, Give reasons why populations of organisms can become extinct, Understand how living things are **named** using the BINOMIAL SYSTEM
EW:	• Explain how to maintain biodiversity, Analyse data relating to these factors, calculate surface area to volume ratio, give examples of adapted plants, Give named examples of animals and the strategies they employ, Explain population cycles and analyse data relating to these, Link air pollution to the impacts that this can have to living things on Earth, Explain the impact of habitat destruction (through deforestation), Know what eutrophication of water is and how it occurs, and be able to explain why sewage and farming chemicals should be dealt with carefully, state the forms in which carbon is passed through the environment, Explain the importance of studying the human genome project, Use key terms correctly and interpret pedigree diagrams accurately, Construct genetic diagrams to show gender inheritance. Understand why living things evolve over time. Can discuss how genetic diseases can be identified before birth and the ethics of such techniques, Explain some of the reasons why certain stages happen in cell division to produce gametes, Consider evidence for or against the theories and describe them in greater detail, Give examples of animals/plants that are selectively, Use named examples and give specific reasons why extinction happened Explain why extinction can drive evolution bred and say WHY they have been bred, Understand and can explain why classification systems have changed over time. Name scientists involved in classifying living things.

<u>Prompt Questions</u>

Now that the revised curriculum has been taught, please consider the Implementation and Impact of the curriculum you taught. What changes might need to be made to the Curriculum Intent (See Curriculum Map and Overviews) in light of this year's experiences?

Please revisit the prompts from last year:

- What are the Key concepts for this unit?
- How will it link to wider disciplinary knowledge/cultural capital: history, culture, authentic artefacts, music, art, literature?
- How does it build on prior knowledge and link to other units, concepts, years, GCSE?
- What is it intended students will have learned?
  - For each Unit? By the end of the Year?
    - GW: ; BI: ; EW
- Is it worth summarising in a knowledge organiser?
- **Assessment: how do you know they have learned the foundational concepts, curriculum and wider disciplinary knowledge? Does assessment look like GCSE light? Should it?**
- Skills used/learned
- Tier 2/3 vocabulary ((Etymology e.g. of Greek/Latin)