West Kirby Grammar School

Curriculum Map – Year 11 – Biology (2024-25)

Topic Name	Term	Skills Developed	Link to NC Subject Content	Next link in curriculum	Other Notes
4.5 Homeostasis and response	Autumn	**4.5.1 Homeostasis** **4.5.2 The human nervous system** Extract and interpret data from graphs, charts and tables, about the functioning of the nervous system. Translate information about reaction times between numerical and graphical forms. **Required practical activity 7:** plan and carry out an investigation into the effect of a factor on human reaction time. Evaluate the benefits and risks of procedures carried out on the brain and nervous system. **4.5.3 Hormonal coordination in humans** Evaluate information around the relationship between obesity and diabetes, and make recommendations taking into account social and ethical issues. Extract information and interpret data from graphs that show the effect of insulin in blood glucose levels in both people with diabetes and people without diabetes. Translate tables and bar charts of glucose, ions and urea before and after filtration.	4.5.1 Homeostasis 4.5.2 The human nervous system 4.5.3 Hormonal coordination in humans 4.5.4 Plant hormones Cells in the body can only survive within narrow physical and chemical limits. They require a constant temperature and pH as well as a constant supply of dissolved food and water. In order to do this the body requires control systems that constantly monitor and adjust the composition of the blood and tissues. These control systems include receptors which sense changes and effectors that bring about changes. In this section we will explore the structure and function of the nervous system and how it can bring about fast responses. We will also explore the hormonal system which usually brings about much slower changes. Hormonal coordination is particularly important in reproduction since it controls the menstrual cycle. An understanding of the role of	**KS5 AQA A-level Biology** 3.6 Organisms respond to changes in their internal and external environments 3.6.1 Stimuli, both internal and external, are detected and lead to a Response 3.6.2 Nervous coordination 3.6.4 Homeostasis is the maintenance of a stable internal environment	**Links from KS3:** KS3 Y7- Reproduction.

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		Describe how kidney dialysis works. Evaluate the advantages and disadvantages of treating organ failure by mechanical device or transplant. (HT only) Be able to extract and interpret data from graphs showing hormone levels during the menstrual cycle. Show why issues around contraception cannot be answered by science alone. Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments. Developments of microscopy techniques have enabled IVF treatments to develop. Understand social and ethical issues associated with IVF treatments. Evaluate from the perspective of patients and doctors the methods of treating infertility. Interpret and explain simple diagrams of negative feedback control. **4.5.4 Plant hormones** **Required practical activity 8:** investigate the effect of light or gravity on the growth of	hormones in reproduction has allowed scientists to develop not only contraceptive drugs but also drugs which can increase fertility		

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		newly germinated seedlings. Record results as both length measurements and as careful, labelled biological drawings to show the effects. Understand how the everyday use of hormones as weed killers has an effect on biodiversity.			
4.7 Ecology	Autumn / Spring (may be swapped with 4.5 to have better weather for required practical work)	**4.7.1 Adaptations, interdependence and competition** Recording first hand observations of organisms. Extract and interpret information from charts, graphs and tables. Students should be able to extract and interpret information from charts, graphs and tables relating to the interaction of organisms within a community. Students should be able to explain how a change in an abiotic factor would affect a given community given appropriate data or context. Extract and interpret information from charts, graphs and tables. Students should be able to extract and interpret information from charts, graphs and tables relating to the effect of abiotic factors on organisms within a community.	4.7.1 Adaptations, interdependence and competition 4.7.2 Organisation of an ecosystem 4.7.3 Biodiversity and the effect of human interaction on ecosystems 4.7.4 Trophic levels in an ecosystem 4.7.5 Food production The Sun is a source of energy that passes through ecosystems. Materials including carbon and water are continually recycled by the living world, being released through respiration of animals, plants and decomposing microorganisms and taken up by plants in photosynthesis. All species live in ecosystems composed of complex communities of animals and plants dependent on each other and that are adapted to particular conditions, both abiotic and biotic. These ecosystems provide essential services that	**KS5 AQA A-level Biology** 3.5 Energy transfers in and between organisms 3.5.3 Energy and ecosystems 3.5.4 Nutrient cycles 3.7 Genetics, populations, evolution and ecosystems 3.7.2 Populations 3.7.4	**Links from KS3:** KS3 Y8 Environmental Science: Interactions and interdependencies

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		Students should be able to explain how a change in a biotic factor might affect a given community given appropriate data or context. Extract and interpret information from charts, graphs and tables. Students should be able to extract and interpret information from charts, graphs and tables relating to the effect of biotic factors on organisms within a community. **4.7.2 Organisation of an ecosystem** In relation to abundance of organisms students should be able to: • understand the terms mean, mode and median • calculate arithmetic means • plot and draw appropriate graphs selecting appropriate scales for the axes. Interpret graphs used to model predator-prey cycles. Students should be able to interpret graphs used to model these cycles. **Required practical activity 9:** measure the population size of a common species in a habitat. Use sampling techniques to	support human life and continued development. In order to continue to benefit from these services humans need to engage with the environment in a sustainable way. In this section we will explore how humans are threatening biodiversity as well as the natural systems that support it. We will also consider some actions we need to take to ensure our future health, prosperity and well-being.	Populations in ecosystems	

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		investigate the effect of a factor on the distribution of this species. Interpret and explain the processes in diagrams of the carbon cycle, the water cycle. Students should be able to: • calculate rate changes in the decay of biological material • translate information between numerical and graphical form • plot and draw appropriate graphs selecting appropriate scales for the axes. **Required practical activity 10:** investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change. Students should be able to evaluate the impact of environmental changes on the distribution of species in an ecosystem given appropriate information. **4.7.3 Biodiversity and the effect of human interaction on ecosystems.** Explain how waste, deforestation and global warming have an impact on biodiversity. Understand the conflict between the need for cheap available compost to increase			

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		food production and the need to conserve peat bogs and peatlands as habitats for biodiversity and to reduce carbon dioxide emissions. Evaluate the environmental implications of deforestation. Understand that the scientific consensus about global warming and climate change is based on systematic reviews of thousands of peer reviewed publications. Explain why evidence is uncertain or incomplete in a complex context. Evaluate given information about methods that can be used to tackle problems caused by human impacts on the environment. Explain and evaluate the conflicting pressures on maintaining biodiversity given appropriate information. **4.7.4 Trophic levels in an ecosystem** Students should be able to construct accurate pyramids of biomass from appropriate data. Calculate the efficiency of biomass transfer between trophic levels.			

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		Students should be able to calculate the efficiency of biomass transfers between trophic levels by percentages or fractions of mass. Students should be able to explain how this affects the number of organisms at each trophic level. **4.7.5 Food production** Interpret population and food production statistics to evaluate food security. Understand that some people have ethical objections to some modern intensive farming methods. Evaluate the advantages and disadvantages of modern farming techniques. Understand how application of different fishing techniques promotes recovery of fish stocks.			
4.6 Inheritance, variation and evolution	Spring / Summer	**4.6.1 Reproduction** Modelling behaviour of chromosomes during meiosis. Historical developments of our understanding of the causes and prevention of malaria.	4.6.1 Reproduction 4.6.2 Variation and evolution 4.6.3 The development of understanding of genetics and evolution 4.6.4 Classification of living organisms	**KS5 AQA A-level Biology** 3.4 Genetic information, variation and relationships between	**Links from KS3:** KS3 Y7 Cells, tissues, and organs Y7 Human Reproduction

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		Interpret a diagram of DNA structure but will not be required to reproduce it. Students should be able to understand the concept of probability in predicting the results of a single gene cross, but recall that most phenotype features are the result of multiple genes rather than single gene inheritance. Students should be able to use direct proportion and simple ratios to express the outcome of a genetic cross. Students should be able to complete a Punnett square diagram and extract and interpret information from genetic crosses and family trees. (HT only) Students should be able to construct a genetic cross by Punnett square diagram and use it to make predictions using the theory of probability. Appreciate that embryo screening and gene therapy may alleviate suffering but consider the ethical issues which arise. **4.6.2 Variation and evolution** Use the theory of evolution by natural	In this section we will discover how the number of chromosomes are halved during meiosis and then combined with new genes from the sexual partner to produce unique offspring. Gene mutations occur continuously and on rare occasions can affect the functioning of the animal or plant. These mutations may be damaging and lead to a number of genetic disorders or death. Very rarely a new mutation can be beneficial and consequently, lead to increased fitness in the individual. Variation generated by mutations and sexual reproduction is the basis for natural selection; this is how species evolve. An understanding of these processes has allowed scientists to intervene through selective breeding to produce livestock with favoured characteristics. Once new varieties of plants or animals have been produced it is possible to clone individuals to produce larger numbers of identical individuals all carrying the favourable characteristic. Scientists have now discovered how to take genes from one species and	organisms 3.4.1 DNA, genes and chromosomes 3.4.3 Genetic diversity can arise as a result of mutation or during meiosis 3.4.4 Genetic diversity and adaptation 3.4.5 Species and taxonomy 3.7 Genetics, populations, evolution and ecosystems 3.7.1 Inheritance 3.7.3 Evolution may lead to speciation 3.8 The control of gene	Y7 Plant Reproduction **Links from KS4:** Y9 Cell Biology – mitosis and the cell cycle Y10 Antibiotics Y11 Role of biotechnology

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		selection in an explanation. Explain the benefits and risks of selective breeding given appropriate information and consider related ethical issues. Students should be able to explain the potential benefits and risks of genetic engineering in agriculture and in medicine and that some people have objections. Interpret information about genetic engineering techniques and to make informed judgements about issues concerning cloning and genetic engineering, including GM crops. Explain the potential benefits and risks of cloning in agriculture and in medicine and that some people have ethical objections. **4.6.3 The development of understanding of genetics and evolution** Students should appreciate that the theory of evolution by natural selection developed over time and from information gathered by many scientists. The theory of speciation has developed over time.	introduce them in to the genome of another by a process called genetic engineering. In spite of the huge potential benefits that this technology can offer, genetic modification still remains highly controversial.	expression 3.8.4 Gene technologies allow the study and alteration of gene function allowing a better understanding of organism function and the design of new industrial and medical processes	

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		Our current understanding of genetics has developed over time. Extract and interpret information from charts, graphs and tables. Appreciate why the fossil record is incomplete. Understand how scientific methods and theories develop over time. **4.6.4 Classification of living organisms** Understand how scientific methods and theories develop over time. Interpret evolutionary trees.			