Year 13 Biology Curriculum Plan							
Unit	Core		Hinterland		NC Coverage	Assessment	Whole Education Opportunities
	Knowledge	Skills	Knowledge	Skills			
Energy transfer in and between organisms	**11- Photosynthesis** 11.1 Overview of photosynthesis 11.2 Light dependent reaction 11.3 Light independent reaction **12- Respiration** 12.1 Glycolysis 12.2 Link reaction and Krebs cycle 12.3 Oxidative phosphorylation 12.4 Anaerobic respiration **13 – Energy and ecosystems** 13.1 Food chains and energy transfer 13.2 Energy transfer and productivity 13.3 Nutrient cycles 13.4 Use of natural and artificial fertilisers 13.5 Environmental issues concerning fertilisers	• Students devise and carry out experiments to investigate the effect of named environmental variables on the rate of photosynthesis using aquatic plants, algae or immobilised algal beads. • Use of chromatography to investigate the pigments isolated from leaves of different plants, eg, leaves from shade-tolerant and shade-intolerant plants or leaves of different colours. • Investigation into the effect of a named factor on the rate of dehydrogenase activity in extracts of chloroplasts. • Students use a redox indicator to investigate dehydrogenase activity. • Investigation into the effect of a named variable on the rate of respiration of cultures of single-celled organisms. • Students could be given data from which to calculate gross primary production and to derive the appropriate units. • Students could carry out investigations to find the dry mass of plant samples or the energy released by samples of plant biomass. • Students could be given data from which to calculate: -the net productivity of producers or consumers from given data. -the efficiency of energy transfers within ecosystems. • Students could be given data from which to calculate percentage yields.	• Investigate what factors would influence the growing of crops on Mars. Linked to light dependent and light independent reactions • Investigate the breathing techniques of Wim Hof on cellular respiration • Investigate the impact of plastics on food chains	• Conducting research and collating relevant information. · Innovative concept creation and consideration and scrutiny of current practices and methods. • Review and analyse data on Wim Hof breathing technique through watching videos and debating the conclusion from the data. • Review and analyse data on microplastics on the organisms in food chains through watching videos and debating the conclusion from the data	3.5.1 3.5.2 3.5.3 and 3.5.4	• · PLC/End of topic assessment • PR point assessments	• SMSC – Should meat eaters eat plant based food? • Careers – Plant biologist, botanist • RSE – access to gluten free foods • Careers – Ecologist • RSE – Is there enough food to feed the entire world?
Genetics, populations, evolution and ecosystems	**17- Inherited change** 17.1 Studying inheritance 17.2 Monohybrid inheritance 17.3 Probability and genetic crosses 17.4 Dihybrid inheritance 17.5 Co-dominance and multiple alleles 17.6 Sex-linkage	• Students investigate genetic ratios using crosses of Drosophila • Students use information to represent phenotypic ratios in monohybrid and dihybrid crosses. • Students show	• Can altering our genetic make-up lead to immortality or at least slow down ageing?	• Conducting research and collating relevant information. · Innovative concept creation and consideration and scrutiny of current practices and methods.	3.7.1	• · PLC/End of topic assessment • PR point assessments	• SMSC – What are the dangers of altering our genes? • Careers – Genetic engineer

	17.7 Autosomal linkage 17.8 Epistasis 17.9 Chi-square test **<u>18 – Populations and evolution</u>** 18.1 Population genetics 18.2 Variation in phenotype 18.3 Natural selection 18.4 Effects of different forms of selection on evolution 18.5 Isolation and speciation **<u>19 – Populations in ecosystems</u>** 19.1 Populations in ecosystems 19.2 Variation in population size 19.3 Competition 19.4 Predation 19.5 Investigating populations 19.6 Succession 19.7 Conservation of habitats	understanding of the probability associated with inheritance. • Students could use the Chi-square test to investigate the significance of differences between expected and observed phenotypic ratios.	• Students investigate whether humans have stopped evolving or is there more evolution to occur. • Students investigate the importance of the amazon rainforest – focus is on conservation of biodiversity	• Review and analyse data on evolution through watching videos and debating the conclusion from the data • Review and analyse data on conservation in the Amazon rainforest through watching videos and debating the conclusion from the data	3.7.2 and 3.7.3 3.7.4		• RSE – Should we keep animals in zoos? • Careers – Field Biologist
The control of gene expression	**<u>20 – Gene mutations</u>** 20.1 Gene mutations 20.2 Stem cells and totipotency 20.3 Regulation of transcription and translation 20.4 Epigenetic control of gene expression 20.5 Gene expression and cancer 20.6 Genome projects **<u>21 - Recombinant DNA technology</u>** 21.1 Producing DNA fragments 21.2 *In vivo* gene cloning 21.3 *In vitro* gene cloning 21.4 Locating genes, genetic screening and counselling 21.5 Genetic fingerprinting	• Students produce tissue cultures of explants of cauliflower • Students investigate the specificity of restriction enzymes using extracted DNA and electrophoresis • Students use gel electrophoresis to produce 'fingerprints' of food dyes.	• Students investigate whether we are capable of curing all cancers. • Students investigate whether the technique of genetic fingerprinting can solve all violent crime.	• Conducting research and collating relevant information. · Innovative concept creation and consideration and scrutiny of current practices and methods. • Review and analyse data on genetic fingerprinting and crime through watching videos and debating the conclusion from the data	• 3.8.1 to 3.8.3 • 3.8.4	• PLC/End of topic assessment • PR point assessments	• Careers - Oncologist • RSE – Is euthanasia wrong even if you have terminal disease? Careers – Genetic counsellor SMSC – Is it right to use organisms in research?
Organisms respond to change in their environments	**<u>14 - Response to stimuli</u>** 14.1 Survival and response 14.2 Plant growth factors 14.3 A reflex arc 14.4 Receptors 14.5 Control of heart rate **<u>15 – Nervous coordination and muscles</u>** 15.1 Neurones and nervous coordination 15.2 The nerve impulse 15.3 Passage of an action potential 15.4 Speed of the nerve impulse	• Students design and carry out investigations into the effects of indoleacetic acid on root growth in seedlings. • Students design and carry out an investigation into the effect of a named variable on human pulse rate. • Students use values of heart rate (R) and stroke volume (V) to calculate cardiac output (CO), using the formula CO = R × V • Students use appropriate units when calculating the maximum frequency of impulse conduction given the refractory period of a neurone	• Students compare measuring heart rate vs heart rate variability to see which is the most effective at improving fitness • Students explore whether we can grow new neurones in the laboratory in order to cure numerous medical conditions	• Conducting research and collating relevant information. · Innovative concept creation and consideration and scrutiny of current practices and methods. • Review and analyse data on growing neurones through watching videos and debating the conclusion from the data	• 3.6.1 • 3.6.2 to 3.6.3	• PLC/End of topic assessment • PR point assessments	• Careers – Neurologist • RSHE – Can our understanding of how synapses work help treat people addicted to drugs?

	15.5 Structure and function of synapse 15.6 Transmission across a synapse 15.7 Structure of skeletal muscle 15.8 Contraction of skeletal muscle **<u>16 – Homeostasis</u>** 16.1 Principles of homeostasis 16.2 Feedback mechanisms 16.3 Hormones and the regulation of blood glucose concentration 16.4 Diabetes and its control 16.5 Control of blood water potential 16.6 Role of the nephron in osmoregulation 16.7 The role of hormones in osmoregulation	• Students examine prepared slides of skeletal muscle using an optical microscope. AT h Students could investigate the effect of repeated muscular contraction on the rate of muscle fatigue in human volunteers.	• Students explore how effective having one kidney is compared to having two kidneys.	• Review and analyse data on just one functioning kidney through watching videos and debating the conclusion from the data	• 3.6.4		• Careers – Nurse • SMSC – Why is diabetes so serious?