

EMMANUEL COLLEGE

THE SCIENCE DEPARTMENT

Year 11



Year 11	Autumn Term	Spring Term
Unit Title	Evolution	Biodiversity and Ecosystems
Key Question(s)?	How does a change in the inherited characteristics of a population over time lead to variation?	How are humans affecting biodiversity and what are the natural systems that support it?
Threshold Concepts	<p>Gene mutations occur continuously and on rare occasions can affect the functioning of the animal or plant.</p> <p>Variation generated by mutations and sexual reproduction is the basis for natural selection; this is how species evolve.</p> <p>The genetic material in the nucleus of a cell is composed of a chemical called DNA. DNA is a polymer made up of two strands forming a double helix. The DNA is contained in structures called chromosomes.</p> <p>Differences in the characteristics of individuals in a population is called variation and may be due to differences in:</p> <ul style="list-style-type: none"> • the genes they have inherited (genetic causes). • the conditions in which they have developed (environmental causes). • a combination of genes and the environment. <p>Selective breeding (artificial selection) is the process by which humans breed plants and animals for particular genetic characteristics.</p> <p>Genetic engineering is the process which involves modifying the genome of an organism by introducing a gene from another organism to give a desired characteristic.</p> <p>Charles Darwin, as a result of observations on an around the world expedition, backed by years of experimentation and discussion and linked to developing knowledge of geology and fossils, proposed the theory of evolution by natural selection.</p>	<p>Feeding relationships within a community can be represented by food chains. All food chains begin with a producer which synthesises molecules. This is usually a green plant or algae which makes glucose by photosynthesis.</p> <p>Consumers that kill and eat other animals are predators, and those eaten are prey. In a stable community the numbers of predators and prey rise and fall in cycles.</p> <p>Temperature, water and availability of oxygen affect the rate of decay of biological material.</p> <p>A great biodiversity ensures the stability of ecosystems by reducing the dependence of one species on another for food, shelter and the maintenance of the physical environment.</p> <p>Humans reduce the amount of land available for other animals and plants by building, quarrying, farming and dumping waste.</p> <p>The efficiency of food production can be improved by restricting energy transfer from food animals to the environment.</p>

Link to Prior Learning	This topic builds on the Year 8 unit on genes and evolution where students have been already introduced to the different types of variation and how they are caused. Darwin's observations were also introduced in this topic.	This builds on the Year 8 topic on ecosystems where students looked at food chain and webs and looked at the way different organisms are dependent on each other within an ecosystem.
Knowledge and Sequencing Rationale	<p>A1: A difficult key concept that needs to be taught after adaptations and genetics when students are more mature. It comes early in Year 11 so that there is time for retrieval practise.</p> <p>A2: November mock exams as part of the whole school reporting cycle.</p> <p>SP1: Genetic engineering follows on from genetics and evolution and artificial selection topic.</p> <p>SP2 and S1 and S2 revision and exams.</p>	