

T4.4 Bioenerge	4.4.1 Photosynthesis	HT ONLY: Explain how the limiting factors of photosynthesis interact, including graphical interpretation (two/three factors) HT ONLY: Explain how limiting factors are important to the economics of greenhouses, including data interpretation HT ONLY: Explain and use inverse proportion in the context of photosynthesis Required practical 5: investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed Describe how the glucose produced in photosynthesis is used by plants				
	4.4.2 Respiration	Describe what happens in respiration, including using a word equation, and recognise the chemical formulas for carbon dioxide, water, oxygen and glucose Describe aerobic and anaerobic respiration with regard to the need for oxygen, the differing products and the relative amounts of energy transferred Recognise the equations for aerobic respiration, anaerobic respiration in muscles and anaerobic respiration in plants and yeast cells Recall what type of respiration fermentation is and its economic importance Describe what happens to heart rate, breathing rate and breath volume during exercise and why these changes occur Explain what happens when muscles do not have enough oxygen and define the term oxygen debt HT ONLY: Explain what happens to accumulated lactic acid in the body Explain the importance of sugars, amino acids, fatty acids and glycerol in the synthesis and breakdown of carbohydrates, proteins and lipids Explain what metabolism is, including examples				
	4.5.1 Homeostasis	Describe what homeostasis is and why it is important, stating specific examples from the human body Describe the common features of all control systems				
	4.5.2 The human nervous system	State the function of the nervous system and name its important components Describe how information passes through the nervous system Describe what happens in a reflex action and why reflex actions are important Explain how features of the nervous system are adapted to their function, including a reflex arc (include all types of neurone and the synapse) Required practical 6: plan and carry out an investigation into the effect of a factor on human reaction time Describe how body temperature is monitored and controlled				
	4.5.3 Hormonal coordination in humans	Describe the endocrine system, including the location of the pituitary, pancreas, thyroid, adrenal gland, ovary and testis and the role of hormones State that blood glucose concentration is monitored and controlled by the pancreas Describe the body's response when blood glucose concentration is too high Explain what type 1 and type 2 diabetes are and how they are treated HT ONLY: Describe the body's response when blood glucose concentration is too low HT ONLY: Explain how glucagon interacts with insulin to control blood glucose levels in the body Describe how water, ions and urea are lost from the body Describe the consequences of losing or gaining too much water for body cells HT ONLY: Recall that protein digestion leads to excess amino acids inside the body and describe what happens to these Describe how the kidneys produce urine HT ONLY: Describe the effect of ADH on the permeability of the kidney tubules and explain how the water level in the body is controlled by ADH Describe how kidney failure can be treated by organ transplant or dialysis and recall the basic principles of dialysis Describe what happens at puberty in males and females, include knowledge of reproductive hormones Describe the roles of the hormones involved in the menstrual cycle (FSH, LH and oestrogen) HT ONLY: Explain how the different hormones interact to control the menstrual cycle and ovulation Describe how fertility can be controlled by hormonal and non-hormonal methods of contraception (giving specific examples from the specification) HT ONLY: Explain how hormones are used to treat infertility, including the steps in IVF HT ONLY: Evaluate the risks and benefits of fertility treatments HT ONLY: Describe the functions of adrenaline and thyroxine in the body, and recall where they are produced HT ONLY: Explain the roles of thyroxine and adrenaline in the body as negative feedback systems				
	4.6.1 Reproduction	Describe features of sexual and asexual reproduction Describe what happens during meiosis and compare to mitosis Describe what happens at fertilisation Describe the structure of DNA and its role in storing genetic information inside the cell Explain the term 'genome' and the importance of the human genome (specific examples from specification only) Describe how characteristics are controlled by one or more genes, including examples Explain important genetic terms: gamete, chromosome, gene, allele, genotype, phenotype, dominant, recessive, homozygous and heterozygous Explain and use Punnett square diagrams, genetic crosses and family trees HT ONLY: Construct Punnett square diagrams to predict the outcomes of a monohybrid cross Describe cystic fibrosis and polydactyly as examples of inherited disorders Evaluate social, economic and ethical issues concerning embryo screening when given appropriate information Describe how the chromosomes are arranged in human body cells, including the function of the sex chromosomes Explain how sex is determined and carry out a genetic cross to show sex inheritance				
	4.6.2 Variation and evolution	Describe what variation is and how it can be caused within a population Describe mutations and explain their influence on phenotype and changes in a species Explain the theory of evolution by natural selection Describe how new species can be formed Describe what selective breeding is Explain the process of selective breeding, including examples of desired characteristics and risks associated with selective breeding Describe what genetic engineering is, including examples and how it is carried out Explain some benefits, risks and concerns related to genetic engineering HT ONLY: Explain the process of genetic engineering, to include knowledge of enzymes and vectors				
	4.6.3 The development of understanding of genetics and evolution	Describe some sources of evidence for evolution Describe what fossils are, how they are formed and what we can learn from them Explain why there are few traces of the early life forms and the consequences of this in terms of our understanding of how life began Describe some of the causes of extinction Describe how antibiotic-resistant strains of bacteria can arise and spread (including MRSA) Describe how the emergence of antibiotic-resistant bacteria can be reduced and controlled, to include the limitations of antibiotic development				
	4.6.4 Classification	Describe how organisms are named and classified in the Linnaean system Explain how scientific advances have led to the proposal of new models of classification, including three-domain system Describe and interpret evolutionary trees				
	4.7.1 Adaptations, interdependence and competition	Recall what an ecosystem is Describe which resources animals and plants compete for and why they do this Explain the terms 'interdependence' and 'stable community' Name some abiotic and biotic factors that affect communities Explain how a change in an abiotic or biotic factor might affect a community Describe structural, behavioural and functional adaptations of organisms Describe what an extremophile is Represent the feeding relationships within a community using a food chain and describe these relationships Explain how and why ecologists use quadrats and transects				

T4.7 Ecology	4.7.2 Organisation of an ecosystem	Describe and interpret predator-prey cycles			
		Required practical 7: measure the population size of a common species in a habitat. Use sampling to investigate the effect of one factor on distribution			
		Describe the processes involved in the carbon cycle			
		Describe the processes involved in the water cycle			
	4.7.3 Biodiversity and the effect of human interaction on ecosystems	Describe what biodiversity is, why it is important and how human activities affect it			
		Describe the impact of human population growth and increased living standards on resource use and waste production			
		Explain how pollution can occur and the impacts of pollution			
		Describe how humans reduce the amount of land available for other animals and plants			
		Explain the consequences of peat bog destruction			
		Describe what deforestation is and why it has occurred in tropical areas			
		Explain the consequences of deforestation			
		Describe how the composition of the atmosphere is changing, and the impact of this on global warming			
		Describe some biological consequences of global warming			
		Describe both positive and negative human interactions in an ecosystem and explain their impact on biodiversity			
		Describe programmes that aim to reduce the negative effects of humans on ecosystems and biodiversity			