

Co-teaching Entry Level Certificate and GCSE Combined Science: Trilogy

Biology

Component 1 – The human body

Component 2 – Environment, evolution and inheritance

This resource provides guidance for co-teaching our new Entry Level Certificate (ELC) Science and Foundation Tier GCSE Combined Science: Trilogy specifications. Our ELC is designed for students who may not achieve a grade 1, but you can also use it as a motivational tool to build confidence for your Foundation Tier students.

Biology: Component 1 – The Human Body

ELC Outcomes	Summary of content covered in ELC	Same theme covered in Combined but extra content	New content on same topic	Rest of Combined Foundation content
1. Cells basic building blocks of living organisms	<p>Parts of a cell.</p> <p>Types of specialisation of cells.</p> <p>Structure related to function.</p>	<p>4.1.1.2 Extra parts – mitochondria and ribosomes. Additional parts in a plant cell</p> <p>4.1.1.3 Specialisation and function of plant cells.</p>	<p>4.1.1.5 Microscopy benefits of electron microscope.</p>	<p>4.8 Key ideas</p> <p>4.1.1.1 Cell structure - eukaryotic and prokaryotic cells. Location of genetic material in prokaryotic cells.</p> <p>4.1.1.4 Cell differentiation Calculations involving magnification.</p> <p>4.1.2 Cell division – all sections.</p> <p>4.1.3 Transport in cells: diffusion, osmosis, active transport.</p> <p>Required practical 2: Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue.</p>

Practical development	Observing and drawing cells	Required practical 1 - using a microscope to observe, draw and label a selection of plant and animal cells. A scale magnification must be included.		
2. Tissue and organs exemplified by human circulatory system and the digestive system	Definition and differences between tissues and organs.	4.2.1 Same content, slight difference in wording.		
	Identify the position and function of the major organs. Role of the heart and blood in the human circulatory system.	4.2.2.2 The heart and blood vessels: Additional details of heart; the double circulatory system; names of blood vessels associated with heart and how their structure is related to their function.		4.2.2.2 Names of structures within the lungs Pacemaker cells 4.2.2.3 Parts of the blood 4.2.2.4 Coronary heart disease 4.2.2.5 Health issues 4.2.2.7 Cancer
3. Human digestive system	Position of the organs in the digestive system Simple role of enzymes	4.2.2.1 Enzymes – definition, function. Variables that effect how enzymes work. Optimal conditions for enzymes. Simple lock and key theory		4.2.2.1 Details of specific enzyme reactions – amylase, proteases and lipases; the role of bile.
Practical development	Investigating the effect of amylase on starch focus on planning and conclusions	Required practical 4 - investigate the effect of pH on the rate of reaction of amylase enzyme. Students should use a continuous sampling technique to determine the time taken to completely digest a starch solution at a range of pH values. Iodine reagent is to be used to test for starch every 30 seconds. Temperature must be controlled by use of a water bath or electric heater.		
4. Respiration	How living organisms make energy by respiration	4.4.2.1 The difference between aerobic and anaerobic respiration; where respiration takes place.	4.4.2.1: Anaerobic respiration - word equation Anaerobic respiration in muscles and yeast cells.	4.8 Key ideas 4.4.2.3 Metabolism

	Effect of lifestyle on health – diet, fitness and exercise (related to pulse rate)	<p>What organisms need energy for.</p> <p>4.2.2.6 Effect of lifestyle on some non-communicable diseases: additional detail.</p> <p>4.4.2.2 Responses to exercise: why there is a change of heart rate, breathing rate and breath volume.</p>		
Practical development	<p>Investigate the effect of exercise on pulse rate.</p> <p>Investigate the effect of caffeine on pulse rate.</p> <p>Comparing energy content in foods (burning crisps/rice cakes)</p>	Required practical 3 - use qualitative reagents to test for a range of carbohydrates, lipids and proteins. To include: Benedict's test for sugars; iodine test for starch; and Biuret reagent for food tests		
5. Infectious (communicable) diseases	<p>Pathogens cause infectious diseases</p> <p>Bacteria and viruses</p>	<p>4.3.1.1 Additional pathogens – fungi. How pathogens infect and spread disease</p> <p>The reduction or prevention of spread of disease.</p>	<p>4.3.1.2 Types of viral diseases: measles and HIV</p> <p>4.3.1.3 Types of bacterial diseases – <i>salmonella</i> and gonorrhoea</p>	<p>4.3.1.1 Additional pathogens – protists</p> <p>4.3.1.2 Other types of viral disease eg Tobacco mosaic virus</p> <p>4.3.1.4 and 5 Types of fungal and protist diseases</p>

Practical development This could also be undertaken for Outcome 7	Evaluate the effect of disinfectants and antibiotics on pre-inoculated agar in Petri dishes.			
6. White blood cells and vaccination	How white blood cells work How a vaccination works	4.3.1.6 Defence against the entry of pathogens The role of the immune system white blood cells – antibody production – phagocytosis – ingestion – antitoxin production 4.3.1.7 Additional content: Global vaccination	4.3.1.8 Antibiotics and painkillers 4.3.1.9 Discovery and development of drugs	
7. Medical drugs	Drug testing: The effects of drugs and the meaning of dependency and withdrawal. The role of antibiotics.		4.3.1.9 Discovery and development of drugs.	
Practical development: As for Outcome 5	Evaluate the effect of disinfectants and antibiotics on pre-inoculated agar in Petri dishes.			
8. Automatic control systems in the human body	The control system - includes nervous responses and reflex	4.5.2 How the CNS coordinates the response of effectors	4.5.2 Reflex arc: why it is important; extract and interpret data about the functioning of the	

	actions.		nervous system.	
Practical development	Compare the speed of catching reflex of two people. Reaction times could also be compared using computer programs.	Required practical 6- plan and carry out an investigation into the effect of a factor on human reaction time.		
9. Hormones	How hormones are released and transported. Exemplified using menstrual cycle	4.5.3.1 Human endocrine system – location of glands and how the pituitary gland in the brain stimulates the release of other hormones 4.5.3.3 Hormones in human reproduction – additional details of the menstrual cycle including FSH, LH and puberty.	4.5.1 Homeostasis 4.5.3.2 Control of blood glucose concentration. Type 1 and 2 diabetes	
10. Uses of hormones in controlling fertility	Oral contraceptives to inhibit fertility. Fertility drugs to stimulate eggs. Benefits and problems of using fertility hormones.	4.5.3.4 Contraception Evaluation of the different hormonal and non-hormonal methods of contraception.		

Biology: Component 2 – Environment, evolution and inheritance

ELC Outcomes	Summary of content covered in ELC	Same theme covered in Combined but extra content	New content on same topic	Rest of Combined Foundation content
1. Photosynthesis	Source of energy for photosynthesis. Word equation for photosynthesis	4.4.1.1 Photosynthesis Additional detail – formulae. 4.4.1.2 Rate of photosynthesis	4.4.1.2 Limiting factors.	4.8 Key Ideas 4.2.3.1 Plant tissues: details of tissue types. 4.2.3.2 Plant organ system Transpiration and factors affecting this. Structure and function of plant organ systems. 4.4.1.3 Uses of glucose from photosynthesis.
Practical development	Investigate the rate of photosynthesis using pond weed.	Required practical 5: investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.		
2. Adaption of animals and plants	How organisms are adapted to live in their natural environment	4.7.1.4 Adaptations.		4.8 Key ideas
Practical development	Investigate the use of choice chambers eg maggots or woodlice.			
3. Food chains and food webs	How feeding relationships are represented by food chains. How food chains are interlinked in a food web	4.7.2.1 Levels of organisation – additional detail.	4.7.1.1 Communities – interdependence and the stability of communities.	4.8 Key ideas

Practical development		Required practical 7: measure the population size of a common species in a habitat. Use sampling techniques to investigate the effect of a factor on the distribution of this species. (<i>cf</i> Outcome 5)		
4. Decay cycle	Living materials are recycled to provide the building blocks for future organisms. When living things decay carbon is released which is then used by plants for photosynthesis	4.7.2.2 How materials are cycled: additional details about the water cycle, the carbon cycle.		4.8 Key ideas
Practical development	Investigate the variables that cause organic material to decay Investigate the change in temperature as grass cuttings decay			
5. Competition	What plants and animals compete for.	4.7.1.2 Abiotic factors – additional detail. 4.7.1.3 Biotic factors – additional detail.		
Practical development	Compare the growth of plants when seeds are planted at different densities	Required practical 7: measure the population size of a common species in a habitat. Use sampling techniques to investigate the effect of a factor on the distribution of this species. (<i>cf</i> Outcome 3)		
6. Environmental changes that effect animals and plants	Simple idea of biotic and abiotic factors affecting living things eg temperature and predation	4.7.1.2 Abiotic factors – additional detail. 4.7.1.3 Biotic factors – additional detail.		

Practical development	Compare the distribution of plants in a trodden and non-trodden area	Required practical 9 Measure the population size of a common species in a habitat. Use sampling techniques to investigate the effect of a factor on the distribution of this species.		
7. Pollution of water, air and the land	Sources of pollution and how the growing population is increasing this pollution.	4.7.3.2 Waste management. 4.7.3.3 Land use	4.7.3.1 Biodiversity – general background. 4.7.3.4 Deforestation 4.7.3.5 Global warming 4.7.3.6 Maintaining biodiversity	.
Practical development	Investigate whether rainwater in a city is more acidic than rainwater in the countryside. Compare the quality of water from different sources eg running and still.	Chemistry Required practical 13: analysis and purification of water samples from different sources, including pH, dissolved solids and distillation. (cf ELC Chemistry Component 4 Outcome 10)		
8. Evolution, natural selection and artificial selection	Evidence for evolution from the fossil record. Simple idea of natural selection using peppered moth as an example of having characteristics most suited to surviving which then allow it to breed successfully Explanation of artificial selection with examples.	4.6.2.2 Evolution - additional detail. 4.6.3.1 Evidence for evolution – additional detail. 4.6.3.2 Fossils – additional detail. 4.6.2.3 Selective breeding – additional detail.	4.6.2.1 Variation – causes of variation in terms of genotype and phenotype; mutations. 4.6.3.3. Extinction	4.8 Key ideas 4.6.3.4 Resistant bacteria including MRSA.

9. Two types of reproduction	Explanation of the difference between sexual and asexual reproduction	4.6.1.1 Sexual and asexual reproduction – additional detail.		4.6.1.2 Meiosis
Practical development	Investigate how alike plants grown from runners are.			
10. Genes, chromosomes and DNA. Principles of genetic engineering	Where and what chromosomes are made of. Chromosomes pairs and inheritance of sex. Potential benefits and risks of genetic engineering.	4.6.1.3 DNA and the genome - additional detail including sequencing and amino acids. 4.6.1.6 Sex determination – additional detail. 4.6.2.4 Genetic engineering – additional detail.	4.6.1.4 Genetic inheritance: definitions and details. 4.6.1.5 Inherited disorders	4.8 Key ideas