

OCR Biology AS and A2 GCE specifications for teaching from September 2015

SciberBrain Topic	Unit		Statement linked to SciberBrain Topic
Stem cells	AS Unit H020	2.1.1	Cell Structure
		2.1.6	In multicellular organisms, stem cells are modified to produce many different types of specialised cell. Understanding how stems cells can be modified has huge potential in medicine.
	A2 Unit H420	5.1.4	Discuss the use of insulin produced by genetically modified bacteria, and the potential use of stem cells, to treat diabetes mellitus.
	HSW		9. Consider applications and implications of science and appreciate their associated benefits and risks; 11. Evaluate the role of the scientific community in validating new knowledge and ensuring integrity;
Vaccinations	AS Unit H020	4.1.1	Define and discuss the meanings of the terms parasite and pathogen Describe the causes and means of transmission of malaria, AIDS/HIV and TB Discuss the global impact of malaria, AIDS/HIV and TB (HSW9, 12); Define the terms immune response, antigen and antibody; Describe the primary defences against pathogens and parasites (including skin and mucus membranes) Describe the structure and mode of action of phagocytes; Describe the structure and the mode of action of antibodies, with reference to the neutralisation and agglutination of pathogens Describe the structure and mode of action of T lymphocytes and B lymphocytes, including the significance of cell signalling and memory cells; Compare and contrast the primary and secondary immune responses; Compare and contrast active, passive, natural and artificial immunity; Explain how vaccination can control disease (HSW9, 12);
	HSW		9. Consider applications and implications of science and appreciate their associated benefits and risks; 11. Appreciate the role of the scientific community in validating new knowledge and ensuring integrity; 12. Appreciate the ways in which society uses science to inform decision-making.
Brain chemistry	A2 Unit H420	5.1.3	Outline the roles of sensory receptors in mammals in converting different forms of energy into nerve impulses; Describe and explain how an action potential is transmitted in a myelinated neurone, with reference to the roles of voltage-gated sodium ion and potassium ion channels; Outline the significance of the frequency of impulse transmission;

			Describe the structure of a cholinergic synapse; The action of neurotransmitters at the synapse.
	A2 Unit H420	5.1.5	Outline the organisation and roles of the autonomic nervous system; Describe, with the aid of diagrams, the gross structure of the human brain, and outline the functions of the functions of the cerebrum, cerebellum, medulla oblongata, hypothalamus and pituitary gland.
	HSW		9. Consider applications and implications of science and appreciate their associated benefits and risks; 11. Appreciate the role of the scientific community in validating new knowledge and ensuring integrity;
Genetic engineering	AS Unit H020	2.1.3	The structure of DNA; To include how hydrogen bonding between complementary base pairs (A to T, G to C) on two antiparallel DNA polynucleotides leads to the formation of a DNA molecule; The nature of the genetic code;
	A2 Unit H420	5.1.4	Discuss the use of insulin produced by genetically modified bacteria, and the potential use of stem cells, to treat diabetes mellitus.
	A2 Unit H420	2.1.3	Genes code for polypeptides, Explain the meaning of the term genetic code; Describe, with the aid of diagrams, the way in which a nucleotide sequence codes for the amino acid sequence in a polypeptide; transcription and translation of genes resulting in the synthesis of polypeptides. To include, the roles of RNA polymerase, messenger (m)RNA, transfer (t)RNA, ribosomal (r)RNA. (HSW8)
		6.1.3	The principles of the polymerase chain reaction (PCR) and its application in DNA analysis; the principles of genetic engineering (ii) the techniques used in genetic engineering To include the isolation of genes from one organism and the placing of these genes into another organism using suitable vectors. To include the use of restriction enzymes, plasmids and DNA ligase to form recombinant DNA with the desired gene and electroporation; Outline how genetic markers in plasmids can be used to identify the bacteria that have taken up a recombinant plasmid; The potential treatments for diabetes mellitus. To include the use of insulin produced by genetically modified bacteria; Explain the term gene therapy and the differences between somatic cell gene therapy and germ line cell gene therapy; Discuss the ethical concerns raised by the genetic manipulation of animals (including humans), plants and microorganisms (HSW4, 9, 11, 12).

	HSW		<p>9. Consider applications and implications of science and appreciate their associated benefits and risks;</p> <p>11. Appreciate the role of the scientific community in validating new knowledge and ensuring integrity;</p> <p>12. Appreciate the ways in which society uses science to inform decision-making.</p>
Clinical trials			
	AS/A2	HSW	<p>9. Consider applications and implications of science and appreciate their associated benefits and risks;</p> <p>11. Appreciate the role of the scientific community in validating new knowledge and ensuring integrity;</p> <p>12. Appreciate the ways in which society uses science to inform decision-making.</p>
Evolution	AS Unit H020	4.2.2	<p>Discuss the fact that classification systems were based originally on observable features but more recent approaches draw on a wider range of evidence to clarify relationships between organisms, including molecular evidence (HSW1, 7a);</p> <p>The evidence for the theory of evolution by natural selection;</p> <p>To include the contribution of Darwin and Wallace in formulating the theory of evolution by natural selection AND DNA and molecular evidence (HSW1, HSW2, HSW5, HSW6, HSW7);</p> <p>Genetic and environmental causes of variation;</p> <p>The different types of adaptations of organisms to their environment;</p>
	A2 Unit H420	5.1.2	The contribution of fossil, DNA and molecular evidence to the theory of evolution by natural selection.
	AS/A2 HSW		<p>1. Use theories, models and ideas to develop and modify scientific explanations.</p> <p>6. Evaluate methodology, evidence and data, and resolve conflicting evidence.</p> <p>11. Appreciate the role of the scientific community in validating new knowledge and ensuring integrity.</p>

