

**Edexcel GCE AS/A2 Biology Curriculum links (First examination 2016)**

<b>SciberBrain Topic</b>	<b>Unit</b>	<b>Topic</b>	<b>Statement linked to SciberBrain Topic</b>
<b>Stem cells</b>	AS Biology A	3	11. Explain what is meant by the terms stem cell, pluripotency and totipotency and discuss the way society uses scientific knowledge to make decisions about the use of stem cells in medical therapies. 13. Explain how cells become specialised through differential gene expression, producing active mRNA leading to synthesis of proteins, which in turn control cell processes or determine cell structure in animals and plants.
	A2 Biology B	7	IV. Understand how differentiated fibroblasts can be reprogrammed to form induced pluripotent stem cells (iPS cells) by the artificial introduction of named genes. V. Understand why the use of iPS stem cells may be less problematic than the use of embryonic stem cells.
<b>Vaccinations</b>	A2	6	6.5 Understand the transmission, mode of infection and pathogenic effect of the following: influenza virus, the malarial parasite ( <i>Plasmodium</i> spp). 6.7 iv. Understand the role of T and B memory cells in the secondary immune response. V. Understand how immunity can be natural or artificial, and active or passive. VI. Understand how vaccination can be used in the control of disease and the development of herd immunity. VI. Understand the potential issues in populations where a proportion choose not to vaccinate.
<b>Brain chemistry</b>	A2 Biology A	8	3. Describe the structure and function of sensory, relay and motor neurones including the role of Schwann cells and myelination. 4. Describe how a nerve impulse (action potential) is conducted along an axon including changes in membrane permeability to sodium and potassium ions and the role of nodes of Ranvier. 5. Describe the structure and function of synapses, including the role of neurotransmitters, such as acetylcholine. 9. Locate and state the functions of the regions of the human brain's cerebral hemispheres (ability to see, think, learn and feel emotions), hypothalamus (thermoregulate), cerebellum

			<p>(coordinate movement) and medulla oblongata (control the heartbeat).</p> <p>17. Explain how imbalances in certain, naturally occurring, brain chemicals can contribute to ill health (e.g. dopamine in Parkinson's disease and serotonin in depression) and to the development of new drugs.</p> <p>18. Explain the effects of drugs on synaptic transmissions, including the use of L-Dopa in the treatment of Parkinson's disease and the action of MDMA in ecstasy</p>
<b>Genetic engineering</b>	AS Biology A	2	<p>i). To know the structure of DNA</p> <p>6. Understand the process of protein synthesis</p> <p>7. Genetic code (triplets)</p> <p>8. Know that a gene is a sequence of bases on a DNA molecule that codes for a sequence of amino acids in a polypeptide chain.</p> <p>11. Describe DNA replication</p> <p>14. Understand how the expression of a gene mutation in people with cystic fibrosis impairs the functioning of the gaseous exchange, digestive and reproductive systems.</p>
	A2	2	<p>2. Explain the nature of the genetic code</p> <p>3. Explain the process of protein synthesis</p>
	A2 Unit 5	8	<p>17. Describe how drugs can be produced using genetically modified organisms (plants and animals and micro-organisms).</p> <p>18. Discuss the risks and benefits associated with the use of genetically modified organisms.</p>
<b>Clinical trials</b>	AS Biology A	1	<p>1.9 Evaluate design of studies used to determine health risk factors (including sample selection and sample size used to collect data that is both valid and reliable).</p>
	AS	4	<p>13. Compare historic drug testing with contemporary drug testing protocols, e.g. William Withering's digitalis soup; double blind trials; placebo; three-phased testing.</p>
	A2	8	<p>11. Discuss the moral and ethical issues relating to the use of animals in medical research from two ethical standpoints.</p> <p>17. Describe how drugs can be produced using genetically modified organisms (plants and animals and micro-organisms).</p>

<b>Evolution</b>	AS Biology B	3	<p>i. Describe how natural selection can lead to adaptation and evolution.</p> <p>ii. Describe the concept of niche and discuss examples of adaptation of organisms to their environment (behavioural, physiological and anatomical).</p> <p>vii Understand the evidence for the three-domain model of classification as an alternative to the five-kingdom model and the role of the scientific community in validating this evidence.</p>
	AS Biology B	3	<p>i. Describe how evolution (a change in the allele frequency) can come about through gene mutation and natural selection.</p>