AS AND A LEVEL BIOLOGY

Switching from OCR to Edexcel Biology A (Salters-Nuffield)

This document is designed to help you compare the existing 2008 OCR Biology specification (H421) with the new 2015 Edexcel Biology A (Salters-Nuffield) specification.

The document gives an overview, at the topic level, of where the material covered in the existing OCR Biology specification can be found in the new Edexcel Biology A (Salters-Nuffield) specification. The following tables then give a more detailed breakdown of the Edexcel specification, and highlight areas of difference. These will help you see where material that you currently teach in the OCR specification is not present in the Edexcel specification; or where the Edexcel specification incorporates material that is new to you.

As a general overview, the 2015 Edexcel Biology A (Salters-Nuffield) specification is split into eight topics. At AS, these topics are: Lifestyle, Health & Risk; Genes & Health; Voice of the Genome; and Biodiversity & Natural Resources. In the second year of the A level, the topics are: On the Wild Side; Immunity, Infection & Forensics; Run for your Life; and Grey Matter.

The course is based on the Salters-Nuffield (SNAB) approach, a context-led approach which, through a dedicated set of resources, introduces the biology using case studies and applications that draw on areas of biology, before considering the underlying biological concepts. The course can also be taught in a thematic way, focusing on areas such as biochemistry, cells, ecology, genetics and so on.

As well as great biology within the specification, there are other ways in which we can help support your teaching on our new A level Biology A (Salters-Nuffield) specification. Our free support includes:

- additional sets of question papers
- Results Plus, now with Mock Analysis service
- Exam Wizard, our online bank of past paper questions
- Getting Started Guides, with course planners
- “Getting Ready to Teach” events
- documents to help deliver the mathematics and practical aspects of the specification
- worksheets for each “core practical” in the specification

Overview of content

OCR (2008)	Edexcel A (Salters-Nuffield) (2015)
1.1.1 Cell Structure	Topic 3: Spec ref(s) 3.2, 3.4, 3.5 Topic 4: Spec ref(s) 4.7, 4.8
1.1.2 Cell Membranes	Topic 2: Spec ref(s) 2.2 and CP3
1.1.3 Cell Division, Cell Diversity, Cellular Organisation	Topic 3: Spec ref(s) 3.1, 3.10, 3.13, 3.9 (part), and CP5
1.2.1 Exchange Surfaces and Breathing	Topic 2: Spec ref(s) 2.1 Topic 7: Spec ref(s) 7.9 (ii) and CP 17
1.2.2 Transport in Animals	Topic 1: Spec ref(s) 1.1 - 1.4 Topic 7: Spec ref(s) 7.8 AND 7.9
1.2.3 Transport in Plants	Topic 4: Spec ref(s) 4.10, 4.11 and CP6
2.1.1 Biological Molecules	Topic 1: Spec ref(s) 1.12 - 1.14 Topic 2: Spec ref(s) 2.9 Topic 4: Spec ref(s) 4.9
2.1.2 Nucleic Acids	Topic 2: Spec ref(s) 2.5, 2.6, 2.7, 2.8 (part)
2.1.3 Enzymes	Topic 2: Spec ref(s) 2.10 and CP 4 Topic 5: Spec ref(s) 5.16 and CP 12
2.2.1 Diet and Food Production	Topic 1: Spec ref(s) 1.5 - 1.10, 1.15 - 1.18
2.2.2 Health and Disease	Topic 6: Spec ref(s) 6.5-6.9
2.3.1 Biodiversity	Topic 4: Spec ref(s) 4.1, 4.2
2.3.2 Classification	Topic 4: Spec ref(s) 4.6
2.3.3 Evolution	Topic 4: Spec ref(s) 4.3, 4.4 Topic 5: Spec ref(s) 5.17 - 5.19
2.3.4 Maintaining Biodiversity	Topic 4: Spec ref(s) 4.16
4.1.1 Communication	Topic 7: Spec ref(s) 7.11 and 7.12
4.1.2 Nerves	Topic 8: Spec ref(s) 8.1 - 8.5
4.1.3 Hormones	Topic 8: Spec ref(s) 8.7
4.2.1 Excretion	N/A
4.3.1 Photosynthesis	Topic 5: Spec ref(s) 5.5 - 5.9 and CP 11
4.4.1 Respiration	Topic 7: Spec ref(s) 7.5 - 7.7 and CP 16
5.1.1 Cellular control	Topic 2: Spec ref(s) 2.5, 2.6, 2.7, 2.8 Topic 3: Spec ref(s) 3.12
5.1.2 Meiosis and variation	Topic 3: Spec ref(s) 3.8 AND 3.9
5.2.1 Cloning Plants and Animals	N/A
5.2.2 Biotechnology	N/A
5.2.3 Genomes and Gene Technologies	Topic 6: Spec ref(s) 6.2 - 6.4 and CP 14
5.3.1 Ecosystems	Topic 5: Spec ref(s) 5.1 - 5.4 and CP 10 Topic 6: Spec ref(s) 6.2
5.3.2 Populations and Sustainability	Topic 5: Spec ref(s) 5.22
5.4.1 Plant Responses	Topic 8: Spec ref(s) 8.6
5.4.2 Animal Responses	Topic 8: Spec ref(s) 8.7 and 8.8 Topic 7: Spec ref(s) 7.1, 7.2 and 7.10
5.4.3 Animal Behaviour	Topic 8: Spec ref(s) 8.12, 8.13 and CP 18

In-depth comparison

Edexcel A (Salters-Nuffield) (2015)	OCR (2008)	What's new for you	What do you no longer teach
Topic 1 Lifestyle, Health and Risk	1.2.1, 1.2.2 2.1.1, 2.2.1, 2.2.2	✓ blood clotting ✓ factors that increase the risk of cardiovascular disease (CVD) ✓ analyse data on illness and mortality rates to determine health risks ✓ evaluate the 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 ✓ perceptions of risks that often differs from the actual risks, including underestimating and overestimating the risks due to diet and other lifestyle factors in the development of heart disease ✓ investigate the effect of caffeine on heart rate in *Daphnia* ✓ benefits and risks of treatments for cardiovascular disease (CVD) (antihypertensives, statins, anticoagulants and platelet inhibitors) ✓ investigate the vitamin C content of food and drink	✓ differences between blood, tissue fluid and lymph ✓ formation of tissue fluid from plasma ✓ role of haemoglobin in carrying oxygen and carbon dioxide ✓ dissociation curves of adult oxyhaemoglobin at different carbon dioxide levels (the Bohr effect) ✓ different affinities of fetal haemoglobin and adult haemoglobin for oxygen ✓ the terms *single circulatory system* and *double circulatory system*, with reference to the circulatory systems of fish and mammals ✓ the terms *open circulatory system* and *closed circulatory system*, with reference to the circulatory systems of insects and fish ✓ structure and function of haemoglobin (a globular protein) and collagen (a fibrous protein) ✓ chemical tests for: protein (biuret test), reducing and non-reducing sugars (Benedict's test), starch (iodine solution) and lipids (emulsion test) ✓ determining the concentration of glucose by using colorimetry

			✓ selective breeding to produce crop plants with high yields, disease resistance and pest resistance ✓ selective breeding to produce domestic animals with high productivity ✓ use of fertilisers and pesticides with plants, and antibiotics with animals, to increase food production ✓ microorganisms to make food for human consumption ✓ salting, adding sugar, pickling, freezing, heat treatment and irradiation to prevent food spoilage by microorganisms
Topic 2: Genes and Health	1.1.2 2.1.2, 2.1.3 5.1.1, 5.1.2	✓ use of Meselson and Stahl's experiment to provide new data that supported the accepted theory of replication of DNA and refuted competing theories ✓ expression of a gene mutation in people with cystic fibrosis impairs the functioning of the gaseous exchange, digestive and reproductive systems ✓ uses of genetic screening, including the identification of carriers, pre-implantation genetic diagnosis (PGD) and prenatal testing, including amniocentesis and chorionic villus sampling ✓ implications of prenatal genetic screening ✓ social and ethical issues related to genetic screening from a range of ethical viewpoints.	✓ cyclic AMP activates proteins by altering their three-dimensional structure ✓ cell signaling ✓ effects that solutions of different water potentials can have upon plant and animal cells ✓ explain electrocardiogram (ECG) traces, with reference to normal and abnormal heart activity ✓ effects of pH on enzyme activity ✓ effects of competitive and non-competitive inhibitors on the rate of enzyme-controlled reactions, with reference to both reversible and non-reversible inhibitors ✓ importance of cofactors and coenzymes in enzyme-controlled reactions ✓ metabolic poisons as enzyme inhibitors ✓ medicinal drugs may work by inhibiting enzyme activity

Topic 3: Voice of the Genome	1.1.1, 1.1.3 5.1.1, 5.1.2	✓ mammalian gametes are specialised for their functions, including the acrosome in sperm and the zona pellucida in the egg ✓ fertilisation in mammals, including the acrosome reaction, the cortical reaction and the fusion of nuclei (more detail than 5.1.2 (d)) ✓ epigenetic changes, including DNA methylation and histonemodification, to modify the activation of certain genes. ✓ how epigenetic changes can be passed on following cell division	✓ cytoskeleton providing mechanical strength to cells, aiding transport within cells and enabling cell movement ✓ process of cell division by budding in yeast ✓ multicellular organisms have cells that are specialised for particular functions ✓ cyclic AMP activates proteins by altering their 3-D structure ✓ genes that control development are similar in plants, animals and fungi, with reference to homeobox sequences ✓ apoptosis (programmed cell death) acting as a mechanism to change body plans ✓ genetic diagrams to solve problems involving codominance ✓ interactions between loci (epistasis) ✓ predict phenotypic ratios in problems involving epistasis ✓ artificial selection to produce the modern dairy cow and wheat
Topic 4: Biodiversity and Natural Resources	1.1.1, 1.2.3 2.1.1, 2.3.1, 2.3.2, 2.3.3, 2.3.4 5.1.2	✓ arrangement of cellulose microfibrils and secondary thickening in plant cell walls contributes to the physical properties of xylem vessels and sclerenchyma fibres in plant fibres that can be exploited by humans ✓ identify sclerenchyma fibres ✓ importance of water and inorganic ions to plants ✓ plant mineral deficiencies ✓ tensile strength of plant fibres ✓ drug testing: from historic to	✓ definition of *transpiration* ✓ transpiration as a consequence of gaseous exchange ✓ factors that affect transpiration rate ✓ potometer used to estimate transpiration rates ✓ how the leaves of some xerophytes are adapted to reduce water loss by transpiration ✓ use of dichotomous key to identify a group of at least six plants, animals or

		contemporary protocols, including William Withering's digitalis soup, double blind trials, placebo, three-phased testing ✓ antimicrobial properties of plants, including aseptic techniques for the safe handling of bacteria ✓ uses of plant fibres and starch to contribute to sustainability, including plant-based products to replace oil-based plastics	microorganisms ✓ evolution of pesticide resistance in insects has implications for humans ✓ importance of international co-operation in species conservation with reference to The Convention in International Trade in Endangered Species (CITES) and the Rio Convention on Biodiversity ✓ significance of environmental impact assessments (including biodiversity estimates) for local authority planning decisions
Topic 5: On the Wild Side	2.1.3, 2.3.3 4.3.1 5.3.1	✓ photosynthesis using isolated chloroplasts (the Hill reaction) ✓ evidence for climate change and its causes, recognising correlations and causal relationships ✓ causes of anthropogenic climate change, including the role of greenhouse gases ✓ extrapolation of data to make predictions used in models of future climate change, which have limitations ✓ effect of temperature on the rate of enzyme activity and its impact on plants, animals and microorganisms ✓ role of the scientific community in validating new evidence e.g. proteomics and genomics, that supports the accepted scientific theory of evolution ✓ effects of temperature on the development of organisms ✓ the way in which scientific conclusions about controversial	✓ definitions of the terms autotroph and heterotroph ✓ investigate experimentally the factors that affect the rate of photosynthesis ✓ how microorganisms recycle nitrogen within ecosystems NOTE, different names are used for Calvin cycle intermediates

		issues, such as what actions should be taken to reduce climate change or the degree to which humans are affecting climate change, can sometimes depend on who is reaching the conclusions ✓ knowledge of the carbon cycle can be applied to methods to reduce atmospheric levels of carbon dioxide ✓ reforestation and the use of sustainable resources, including biofuels, as examples of the effective management of the conflict between human needs and conservation	
Topic 6: Immunity, Infection and Forensics	5.2.3, 2.2.2,	✓ how to determine the time of death of a mammal by examining the extent of decomposition, stage of succession, forensic entomology, body temperature and degree of muscle contraction ✓ role of micro-organisms in the decomposition of organic matter and the recycling of carbon ✓ compare the structure of bacteria and viruses ✓ how *mycobacterium tuberculosis* (TB) and Human Immunodeficiency Virus (HIV) infect human cells, causing a sequence of symptoms that may result in death ✓ how one gene can give rise to more than one protein through post-transcriptional changes to messenger RNA (mRNA) ✓ difference between	✓ how microorganisms recycle nitrogen within ecosystems. ✓ the responses of governments and other organisations to the threat of new strains of influenza each year ✓ effects of smoking on the mammalian gas exchange system, with reference to the symptoms of chronic bronchitis, emphysema (chronic obstructive pulmonary disease) and lung cancer

		bacteriostatic and bactericidal antibiotics ✓ effect of different antibiotics on bacteria ✓ how understanding the contributory causes of hospital acquired infections have led to codes of practice regarding antibiotic prescription and hospital practice that relate to infection prevention and control	
Topic 7: Run for your Life	1.2.1 4.1.1, 4.3.1, 4.4.1 5.4.2	✓ calculate cardiac output ✓ structural and physiological differences between fast and slow twitch muscle fibres ✓ interpretation of data relating to possible disadvantages of exercising too much and exercising too little, recognising correlation and causal relationships ✓ how medical technology, including the use of keyhole surgery and prostheses, is enabling those with injuries and disabilities to participate in sports ✓ discuss different ethical positions relating to whether the use of performance-enhancing substances by athletes is acceptable.	✓ differences between blood, tissue fluid and lymph ✓ how tissue fluid is formed from plasma ✓ role of haemoglobin in carrying oxygen and carbon dioxide ✓ dissociation curves of adult oxyhaemoglobin at different carbon dioxide levels (the Bohr effect) ✓ different affinities of fetal haemoglobin and adult haemoglobin for oxygen ✓ distribution of cartilage, ciliated epithelium, goblet cells, smooth muscle and elastic fibres in the trachea, bronchi, bronchioles and alveoli of the mammalian gaseous exchange system ✓ functions of cartilage, cilia, goblet cells, smooth muscle and elastic fibres in the mammalian gaseous exchange system ✓ mechanism of breathing in mammals, with reference to the function of the rib cage, intercostal muscles and diaphragm ✓ cells communicate with each other by cell signaling

			✓ experimental evidence for the theory of chemiosmosis ✓ difference in relative energy values of carbohydrate, lipid and protein respiratory substrates. ✓ how the fight or flight response to environmental stimuli is coordinated by the nervous and endocrine systems in mammals
Topic 8: Grey Matter	4.1.2, 4.1.3 5.2.3, 5.4.1, 5.4.2, 5.4.3	✓ how magnetic resonance imaging (MRI), functional magnetic resonance imaging (fMRI), positron emission tomography (PET) and computed tomography (CT) scans are used in medical diagnosis and the investigation of brain structure and function ✓ what happens during the critical period so that mammals can develop their visual capacities to the full ✓ the action of MDMA in Ecstasy ✓ how the outcomes of genome sequencing projects are being used in the development of personalised medicine and the social, moral and ethical issues this raises ✓ methods used to investigate the contributions of nature and nurture to brain development, including evidence from the abilities of new-born babies, animal experiments, studies of individuals with damaged brain areas, twin studies and cross-cultural studies	✓ the terms *exocrine gland, hormone* and *target tissue* ✓ the terms *first messenger* and *second messenger*, with reference to adrenaline and cyclic AMP (cAMP) ✓ functions of the adrenal glands ✓ histology of the pancreas, and its role as an endocrine and exocrine gland ✓ how blood glucose concentration is regulated, with reference to insulin, glucagon and the liver ✓ control of insulin secretion, with reference to potassium channels and calcium channels in beta cells ✓ causes of Type 1 (insulin-dependent) and Type 2 (non-insulin-dependent) diabetes mellitus ✓ use of insulin produced by genetically modified bacteria, and the potential use of stem cells, to treat diabetes mellitus ✓ genetic engineering of Golden Rice™ ✓ animals can be genetically engineered for xenotransplantation ✓ the term *gene therapy;* ✓ differences between somatic cell

			gene therapy and germ line cell gene therapy ✓ role of auxins in the control of apical dominance and gibberellin in the control of stem elongation ✓ role of hormones in leaf loss in deciduous plants ✓ how plant hormones are used commercially ✓ escape reflexes, taxes and kineses as examples of genetically-determined innate behaviours ✓ imprinting, classical and operant conditioning, latent and insight learning as examples of learned behaviours ✓ advantages of social behaviour in primates

No equivalent section in Edexcel Biology A			✓ define the term *excretion* ✓ importance of removing metabolic wastes, including carbon dioxide and nitrogenous waste, from the body ✓ histology and gross structure of the liver ✓ formation of urea in the liver, including the ornithine cycle ✓ role of the liver in detoxification ✓ histology and gross structure of the kidney ✓ detailed structure of a nephron and its associated blood vessels ✓ production of urine, with reference to ultrafiltration and selective reabsorption ✓ control of the water content of the blood, with reference to the roles of the kidney, osmoreceptors in the hypothalamus and the posterior pituitary gland ✓ problems that arise from kidney failure ✓ renal dialysis and transplants for the treatment of kidney failure ✓ how urine samples can be used to test for pregnancy and detect misuse of anabolic steroids ✓ reproductive and non-reproductive cloning ✓ natural clones in plants using the example of vegetative propagation in elm trees ✓ production of artificial clones of plants from tissue culture ✓ advantages and disadvantages of plant cloning in agriculture ✓ how artificial clones of animals

			can be produced ✓ advantages and disadvantages of cloning animals ✓ biotechnology as the industrial use of living organisms (or parts of living organisms) to produce food, drugs or other products ✓ how enzymes can be immobilized and used in large-scale production ✓ continuous culture and batch culture ✓ limiting factors in determining the final size of a population ✓ the term *carrying capacity* ✓ predator–prey relationships and their possible effects on the population sizes of both the predator and the prey ✓ the terms *interspecific* and *intraspecific* competition ✓ the terms *conservation* and *preservation* ✓ how the management of an ecosystem can provide resources in a sustainable way, with reference to timber production ✓ conservation as a dynamic process involving management and reclamation ✓ economic, social and ethical reasons for conservation of biological resources ✓ effects of human activities on the animal and plant populations in the Galapagos Islands