



### A Level Biology (2022/2023)

### A Level Biology Overview (Year 13)

In A Level Biology, pupils will continue to build on the principles and concepts that they learnt in Year 12. Pupils will support their learning of theory through the completion of a number of required practicals. Pupils will be encouraged to apply their understanding to past exam questions throughout the lessons and their self-study revision.

It is expected that A Level students will complete a minimum of 7 hours extra self-study outside their lesson time. This may be in the form of research, homework or completion of past papers. Teachers will set the pupils adequate homework to help individuals focus their time.

In Biology there will be a minimum of two assessments per half term to identify any gaps in knowledge/understanding that pupils may have and ensure that they are identified and addressed as soon as possible to ensure maximum progression.

Topic of Learning		Half-Termly Overview: Knowledge and Skills	Sample Assessments
HTI	<p><b>Energy transfers in and between organisms</b></p> <ul style="list-style-type: none"> <li>• Photosynthesis</li> <li>• Respiration</li> <li>• Energy and Ecosystems</li> <li>• Nutrient Cycles</li> </ul>	<p><b>By the end of the unit, pupils should be able to:</b></p> <ul style="list-style-type: none"> <li>• Know and describe the stages of the light dependent reaction</li> <li>• Discuss the importance of photolysis</li> <li>• Identify environmental factors that limit the rate of photosynthesis</li> <li>• Know and describe the stages of the light dependent reaction</li> <li>• Understand where each reactant and product of the light dependent and light independent stage of photosynthesis originates and where the products are used.</li> <li>• Evaluate the relationship between the light dependent and light independent stages of photosynthesis.</li> <li>• Evaluate data relating to common agricultural practices used to overcome the effect of limiting factors</li> <li>• Explain the process of glycolysis</li> <li>• Compare and contrast aerobic and anaerobic respiration</li> <li>• Discuss the changing number of carbons throughout the Krebs Cycle.</li> </ul>	<p><b>Required practical 7:</b> Use of chromatography to investigate the pigments isolated from leaves of different plants, e.g. leaves from shade-tolerant and shade-intolerant plants or leaves of different colours.</p> <p><b>Required practical 8:</b> Investigation into the effect of a named factor on the rate of dehydrogenase activity in extracts of chloroplasts.</p> <p><b>Required practical 9:</b> Investigation into the effect of a named variable on the rate of respiration of cultures of single-celled organisms.</p> <p>Mid Term Assessment – Photosynthesis and Respiration</p>



		<ul style="list-style-type: none"> <li>Evaluate the role of ATP throughout the process of respiration.</li> <li>Discuss redox reactions in both photosynthesis and respiration.</li> <li>Calculate gross primary production and to derive the appropriate units.</li> <li>Calculate the net productivity of producers or consumers from given data</li> <li>Calculate the efficiency of energy transfers within ecosystems.</li> <li>Appreciate the ways in which production is affected by farming practices designed to increase the efficiency of energy transfer</li> <li>Explain the nitrogen cycle and discuss the role of nitrogen at each stage.</li> <li>Understand the importance of microorganisms in nutrient cycles</li> <li>Discuss the advantages and disadvantages of using artificial and natural fertilisers</li> <li>Evaluate environmental issues that may occur as a result of fertilisers including leaching and eutrophication</li> </ul>	<p>End of HT1 assessment – All content to date</p>
<p>HT2</p>	<p><b>Organisms responses to changes in their internal and external environment</b></p> <ul style="list-style-type: none"> <li>Survival and Response</li> <li>Receptors</li> <li>Control of Heart Rate</li> <li>Nervous System</li> <li>Homeostasis</li> </ul>	<p><b>By the end of the unit, pupils should be able to:</b></p> <ul style="list-style-type: none"> <li>Discuss basic responses that plants and animals elicit as a result to a change in the external environment</li> <li>Understand the importance of the reflex arc</li> <li>Explain the role of IAA in plant cell elongation</li> <li>Understand the role of receptors</li> <li>Know the structure and function of the Pacinian corpuscle as an example of a receptor</li> <li>Understand the adaption of different receptors in the eye</li> <li>Know the structure of the heart including the position of the SAN and AVN</li> <li>Discuss the control of heart rate</li> <li>Understand the roles of the autonomic nervous system and effectors in controlling heart rate</li> <li>Calculate stroke volume and cardiac output when given sufficient information</li> <li>Describe the structure of a myelinated motor neurone and relate its structure to its function</li> </ul>	<p><b>Required practical 10:</b> Investigation into the effect of an environmental variable on the movement of an animal using either a choice chamber or a maze.</p> <p><b>Required practical 11:</b> Production of a dilution series of a glucose solution and use of colorimetric techniques to produce a calibration curve with which to identify the concentration of glucose in an unknown 'urine' sample.</p> <p>Mid Term Assessment – Nervous System/Control of Heart Rate</p> <p>End of Term Assessment – Homeostasis</p>



		<ul style="list-style-type: none"> <li>• Explain how a resting potential is established</li> <li>• Understand the all or nothing principle.</li> <li>• Compare and contrast the transfer of a nerve impulse along a myelinated and unmyelinated</li> <li>• Evaluate factors affecting the speed of nerve transmission.</li> <li>• Describe the structure of a synapse and neuromuscular junction</li> <li>• Explain the sequence of events involved in transmission across a cholinergic synapse in sufficient detail</li> <li>• Compare transmission across a neuromuscular junction and cholinergic synapse.</li> <li>• Use information provided to predict and explain the effects of specific drugs on a synapse.</li> <li>• Understand the structure, location and general properties of slow and fast skeletal muscle fibres.</li> <li>• Explain how a muscle contraction occurs</li> <li>• Interpret information relating to examples of negative and positive feedback.</li> <li>• Discuss, in detail, the role of insulin, glucagon and adrenaline in the control of blood sugar levels.</li> <li>• Explain the causes of Type 1 and Type 2 diabetes</li> <li>• Evaluate the positions of health advisers and the food industry in relation to the increased incidence of type II diabetes.</li> <li>• Discuss the action at each stage along the nephron to control blood water potential.</li> <li>• Describe the action of ADH in the collecting duct.</li> </ul>	
<p><b>HT3</b></p>	<p><b>Genetics, Populations, Evolution and Ecosystems</b></p> <ul style="list-style-type: none"> <li>• Inheritance</li> <li>• Speciation</li> <li>• Populations</li> </ul>	<p><b>By the end of the unit, pupils should be able to:</b></p> <ul style="list-style-type: none"> <li>• Know the definitions of key words within genetics</li> <li>• Understand how to use fully labelled genetic diagrams to interpret, or predict, the results of monohybrid and dihybrid crosses</li> <li>• Use information to represent phenotypic ratios in monohybrid and dihybrid crosses</li> <li>• Use of the chi-squared (<math>\chi^2</math>) test to compare the goodness of fit of observed phenotypic ratios with expected ratios</li> </ul>	<p><b>Required practical 12:</b> Investigation into the effect of a named environmental factor on the distribution of a given species.</p> <p>End of HT3 Assessment – Genetics, Populations, Evolution and Ecosystems</p>



		<ul style="list-style-type: none"> <li>• Show understanding of the probability associated with inheritance</li> <li>• Apply the concept of gene pool and allele frequency</li> <li>• Understand and apply the Hardy – Weinberg principle to predict allele frequency</li> <li>• Calculate allele, genotype and phenotype frequencies from appropriate data using the Hardy–Weinberg equation</li> <li>• Discuss factors that impact upon natural selection</li> <li>• Evaluate the effects of stabilising, directional and disruptive selection.</li> <li>• Explain why individuals within a population of a species may show a wide range of variation in phenotype</li> <li>• Explain why genetic drift is important only in small populations</li> <li>• Explain how natural selection and isolation may result in change in the allele and phenotype frequency and lead to the formation of a new species</li> <li>• Explain how evolutionary change over a long period of time has resulted in a great diversity of species.</li> <li>• Show understanding of the need to manage the conflict between human needs and conservation in order to maintain the sustainability of natural resources</li> <li>• Evaluate evidence and data concerning issues relating to the conservation of species and habitats and consider conflicting evidence</li> <li>• Use given data to calculate the size of a population estimated using the mark-release-recapture method.</li> </ul>	
<p><b>HT4</b></p>	<p><b>Gene Expression</b></p> <ul style="list-style-type: none"> <li>• Transcription</li> <li>• Translation</li> <li>• Genome Project</li> <li>• Recombinant DNA technology</li> <li>• Genetic Fingerprinting</li> </ul>	<p><b>By the end of the unit, pupils should be able to:</b></p> <ul style="list-style-type: none"> <li>• Know, in detail, the structure of proteins</li> <li>• Understand that mutations occur at DNA replication</li> <li>• Discuss what type of mutations may occur and the impact this may have</li> <li>• Relate the nature of a gene mutation to its effect on the encoded polypeptide.</li> <li>• Discuss the origin of stem cells</li> <li>• Explain the potential applications of pluripotent stem cells</li> <li>• Evaluate the use of stem cells in treating human disorders.</li> </ul>	<p>End of HT4 – Mock A Level Biology exam</p>



		<ul style="list-style-type: none"> <li>• Understand the role of transcription factors in gene expression</li> <li>• Explain epigenetic control of gene expression in eukaryotic cells</li> <li>• Discuss potential roles of epigenetics in cancer treatment advancement</li> <li>• Interpret data provided from investigations into gene expression</li> <li>• Evaluate appropriate data for the relative influences of genetic and environmental factors on phenotype.</li> <li>• Evaluate evidence showing correlations between genetic and environmental factors and various forms of cancer</li> <li>• Interpret information relating to the way in which an understanding of the roles of oncogenes and tumour suppressor genes could be used in the prevention, treatment and cure of cancer.</li> <li>• Explain what the genome project is and what it is used for</li> <li>• Interpret information relating to the use of recombinant DNA technology</li> <li>• Evaluate the ethical, financial and social issues associated with the use and ownership of recombinant DNA technology in agriculture, in industry and in medicine</li> <li>• Balance the humanitarian aspects of recombinant DNA technology with the opposition from environmentalists and antiglobalisation activists</li> <li>• Relate recombinant DNA technology to gene therapy.</li> <li>• Evaluate information relating to screening individuals for genetically determined conditions and drug responses</li> <li>• Explain the biological principles that underpin genetic fingerprinting techniques</li> <li>• Interpret data showing the results of gel electrophoresis to separate DNA fragments</li> <li>• Explain why scientists might use genetic fingerprinting in the fields of forensic science, medical diagnosis, animal and plant breeding.</li> </ul>	
<p><b>HT5</b></p>	<p><b>Exam Prep/Revision/ Synoptic Essays</b></p>	<p>Synoptic essays (Preparation for Paper 3) will be reviewed during this half term where students are required to demonstrate the ability</p>	



# ARNOLD LODGE

4 - 18 yrs Co-educational Independent Day School

## Key Stage 5: Curriculum Map

		to draw together different areas of knowledge and understanding within one answer. <i>Revision will be targeted to the needs of the individuals in the class.</i>	
<b>HT6</b>	<b>External Examinations</b>	<b>External Examinations</b>	External A Level Biology Exam