









Applied General Science CURRICULUM MAP YEAR 13

<p>HALF TERM 1: Teacher 1: Unit 4 – The Human Body (exam) Teacher 2: Unit 5 Independent Practical Investigation (portfolio)</p> <p>Key knowledge – Teacher 1 The Human Body</p> <ul style="list-style-type: none"> To outline the digestive system, including the roles of the liver, the gall bladder and pancreas and explanation of the chemical digestion process To describe the role of condensation and hydrolysis reactions in the bond-making and bond-breaking of carbohydrates, proteins and lipids in chemical digestion and assimilation. To recall differences between nervous and hormonal control of the digestive system (gastrin) To explain how the small intestine is adapted for efficient digestion and absorption. Describe the uses of macronutrients and micronutrients in the body and know what occurs when deficiency happens To describe the structure and function of the human skeleton, including the structure of synovial joints and gliding/hinge joints To recall the main features of a myofibril, including: myosin filaments (thick filaments) actin filaments (thin filaments) Z line, A band, H band and I band. To describe the sliding filament theory for muscle contraction and know the role of calcium within muscular contraction To discuss adaptations of diet for athletes in training, including the use of creatine supplements. Oxygen Transport: To recall the structure of haemoglobin and its association with oxygen. To recall the partial pressure of oxygen $p(O_2)$ and use an oxygen dissociation curve to explain how oxygen is carried by haemoglobin. To know how the presence of carbon dioxide assists in the dissociation of oxygen and shifts the curve to the right (the Bohr effect). To describe how training at high altitudes affects oxygen transportation and how to use a pulse oximeter to measure oxygen saturation as a non-invasive method. To research the effect of diseases such as emphysema or cystic fibrosis on oxygen saturation levels. To know the effect of high/low blood pressure on health. 		<p>Supporting texts or wider reading</p> <p>Reading and extracting information from A Level Biology textbook on Digestive system, Skeletal System and Oxygen Transport To research scientific journal/ journal articles on cystic fibrosis and emphysema</p>
<p>Key skills – Teacher 1</p> <ul style="list-style-type: none"> To carry out food tests on major food groups using known reagents To model the digestive system using Visking Tubing To carry out enzyme-controlled reactions using amylase, proteases and lipases 		<p>Opportunities for extended writing</p> <p>Extended Writing: The effects of emphysema and cystic fibrosis on lung structure and function</p> <p>Scientific Report: Investigating the factors that affect voltage in electrochemical cells (Unit 5)</p>
<p>Key skills – Teacher 1</p> <ul style="list-style-type: none"> To carry out food tests on major food groups using known reagents To model the digestive system using Visking Tubing To carry out enzyme-controlled reactions using amylase, proteases and lipases 		<p>Speak like an expert</p> <p>Presentation:</p> <ul style="list-style-type: none"> (i) Deficiency Diseases and how to prevent them (Unit 4) (ii) Electrochemical cells presentation – prepare a presentation for a targeted audience (Unit 5)
<p>Key skills – Teacher 1</p> <ul style="list-style-type: none"> To carry out food tests on major food groups using known reagents To model the digestive system using Visking Tubing To carry out enzyme-controlled reactions using amylase, proteases and lipases 		<p>Links to careers, personal development and other subject areas.</p> <p>Mathematics: To produce line graphs to track the progress of enzyme reactions and calculate the rate of reaction from gradients Use of graphs to produce oxygen dissociation curves and demonstrate the Bohr Shift/ Analysis of practical data for fermentation practical To calculate mean and standard deviation for values produced in electrochemical cells investigation To select appropriate graphs to represent data produced from Unit 5 investigation</p> <p>Library Skills: Production of Harvard referencing System for Bibliography</p> <p>Health and Social Care: Blood pressure as an indicator for good health</p> <p>Physical Education Training methods to support maximum oxygen saturation of the blood Muscular and Skeletal system structure</p>





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<ul style="list-style-type: none"> To know how to use a sphygmomanometer to measure blood pressure. To know how to use a colorimeter to track enzyme reactions <p>Key Knowledge – Teacher 2</p> <ul style="list-style-type: none"> To recall the structure of an electrochemical cell and describe their workings To define key terms related to electrochemical cells To recall the reactivity series of metals and apply this to electropotential produced via electrochemical cells To recall the factors that affect the voltage of an electrochemical cell To research the standard electrode potentials for a variety of metal and metal solutions <p>Key Skills – Teacher 2</p> <ul style="list-style-type: none"> To use secondary sources (internet/ textbooks/ scientific journals) to research electrochemical cells and develop an outline for the practical investigation To plan the electrochemical practical investigation and justify the approaches used (outlining any standard procedures and techniques used) To prepare risk assessments and carry out the practical investigation (reference made to CLEAPPS student safety sheets) To record data in clearly labelled tables and diagrams (data should be both qualitative and quantitative) To analyse data using graphs and draw conclusions To evaluate the techniques used in the practical and the outcomes achieved, identifying any anomalous results To make use of IT to analyse data e.g. Excel Spreadsheets To use the Harvard Referencing System to produce a detailed Bibliography To produce a presentation aimed at a targeted audience to display results of overall practical investigation and perform this to an A Level audience 		
<p>HALF TERM 2: Teacher 1: Unit 4 – The Human Body (exam) Teacher 2: Unit 5 – Independent Practical Investigation (portfolio)</p> <p>Key Knowledge – Teacher 1</p> <ul style="list-style-type: none"> To recall the structure of the nervous system into the central nervous system (CNS) and the peripheral nervous system (PNS). 		<p>Supporting texts or wider reading</p> <p>Advanced Level Biology Textbook/ NHS Website for medical condition research/ Scientific journal articles on advances in treatment of Alzheimer’s and Parkinson’s Disease</p>
<ul style="list-style-type: none"> To recall the structure of the nervous system into the central nervous system (CNS) and the peripheral nervous system (PNS). 		<p>Opportunities for extended writing</p> <p>Unit 4: Write a research article into the causes of depression and how it may be treated</p>







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<ul style="list-style-type: none"> To know the difference between somatic and automatic nervous systems, and the sympathetic and para sympathetic nervous systems. To understand the role of the sympathetic nervous system in controlling physiological responses, such as increasing heart rate and dilating pupils, to threatening situations. To describe the role of the parasympathetic nervous system in maintaining normal physiological functioning, such as decreasing heart rate and stimulating the digestive system. The Brain: recall roles of the four lobes of the cerebral cortex and the role of the cerebellum in controlling skeletal muscle for fine movement, coordination, posture and balance. To know how brain damage may result in symptoms that indicate the area of the brain that has been affected and give examples of where this has occurred Nervous propagation: To explain the roles of Na and K ions in creating a resting potential, action potential and how nerve cells are adapted to do this. The components of a synapse and what happens when an action potential arrives at a synapse and how drugs/ medication can affect synaptic transmission To research disorders arising from problems with neurotransmitters and synaptic transmission, such as Alzheimer's and Parkinson's disease and medications used in treating these illnesses To recall action of drugs that are used to treat depression and give some specific examples e.g. Prozac <p>Key Skills – Teacher 1</p> <ol style="list-style-type: none"> Production of flow charts to illustrate nervous impulse transmission Factors affecting nervous system responses – testing the effects of caffeine on nervous impulses (Practical activity and analysis of results) <p>Key Knowledge – Teacher 2</p> <ul style="list-style-type: none"> To recall the structure of an electrochemical cell and describe their workings To define key terms related to electrochemical cells To recall the reactivity series of metals and apply this to electropotential produced via electrochemical cells To recall the factors that affect the voltage of an electrochemical cell To research the standard electrode potentials for a variety of metal and metal solutions <p>Key Skills – Teacher 2</p>	 	<p>Unit 5: Electrochemical cells Practical: Report written and submitted for assessment (AQA Criteria used Pass/ Merit/ Distinction)</p> <p>Speak like an expert</p> <p>Unit 5: Prepare a presentation on electrochemical cells for a targeted audience (Unit 5 assessment – Pass/Merit/Distinction)</p> <p>Links to careers, personal development and other subject areas.</p> <p>Mathematics: To calculate mean and standard deviation for values produced in electrochemical cell practical To select appropriate graphs to represent data produced and be able to identify anomalous results</p> <p>IT: Use of Excel to produce spreadsheets of data and graphs Calculation of standard error in results and represent this on graphs</p> <p>Health and Social Care: Conditions affecting nervous coordination – such as Alzheimers and Parkinsons and effects of quality of life and care needed</p>
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<ul style="list-style-type: none"> To use secondary sources (internet/ textbooks/ scientific journals) to research electrochemical cells and develop an outline for the practical investigation To plan the electrochemical practical investigation and justify the approaches used (outlining any standard procedures and techniques used) To prepare risk assessments and carry out the practical investigation (reference made to CLEAPPS student safety sheets) To record data in clearly labelled tables and diagrams (data should be both qualitative and quantitative) To analyse data using graphs and draw conclusions To evaluate the techniques used in the practical and the outcomes achieved, identifying any anomalous results To make use of IT to analyse data e.g. Excel Spreadsheets To use the Harvard Referencing System to produce a detailed Bibliography To produce a presentation aimed at a targeted audience to display results of overall practical investigation and perform this to an A Level audience 		
<p>HALF TERM 3: Teacher 1: Units 1, 2, 3 and 4 improvements as required. Teacher 2: Unit 6a: Microbiology</p> <p><u>Key Knowledge: Teacher 2</u> Performance outcome 1: Identify the main groups of microorganisms in terms of their structure Performance outcome 2: Use aseptic techniques to safely cultivate microorganisms</p> <ul style="list-style-type: none"> To identify the main groups of microorganisms in terms of their structure and function (viruses, bacteria and animal cells). To describe ways of identifying microorganisms, such as: Gram staining; Microscopy (light and electron microscopes) and Colony characteristics <p><u>Key Skills: Teacher 2</u></p> <ul style="list-style-type: none"> To research the ultrastructure of akaryotes (viruses), prokaryotes (bacteria) and eukaryotes (microscopic fungi) using appropriate sources, such as internet and Advanced level Biology textbooks To perform Gram staining techniques on a culture of named bacteria (Gram positive and Gram negative) To grow and count bacterial colonies, using standard aseptic techniques To estimate population size of bacteria by colony counting 	   	<p>Supporting texts or wider reading</p> <p>Advanced level Biology textbooks, internet and scientific journal papers all need to be used to research microbe structure and function, and factors affecting growth of microbes</p> <p>Opportunities for extended writing</p> <p>Full practical report written including practical details, results, risk assessments and research evidence</p> <p>Speak like an expert</p> <p>Scientific report using keywords and knowledge to justify outcomes. Individual practical work required for assessment (Unit 6)</p> <p>Links to careers, personal development and other subject areas.</p> <p>Mathematics Use of standard form for bacterial cell counts Micrometry and conversions using a scale Tabulation of repeated data and calculation of mean values Scatter and line graphs Standard Deviation and standard error calculations</p> <p>ICT</p>











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<ul style="list-style-type: none"> To research and compare how various identification techniques are used in biotechnological industries To carry out 3 of the following techniques on 2 different types of bacteria: Streak plate, Lawn plate, Pour plate, Mycelial disk or Viral plaque To explain the control measures for each practical in a full risk assessment To reflect on the effectiveness of the techniques used and suggest improvements to each technique 		<p>Use of Excel to produce tables of repeated data and generate calculations such as mean, standard deviation and standard error Production of scatter graphs and bar graphs to analyse results</p> <p>Health and Safety To produce full risk assessments identifying potential hazards and ways to control the risk in practical work undertaken</p> <p>External Visits: Would be beneficial to visit a Microbrewery prior to the start of this assignment to see how microbes are used to produce small batches of bespoke craft beers and also observe the fermentation process first-hand.</p>
<p>HALF TERM 4: Teacher 1: Units 1, 2, 3 and 4 improvements as required. Teacher 2: Unit 6a: Microbiology</p> <p><u>Key Knowledge – Teacher 2</u> Performance outcome 3: Use practical techniques to investigate factors that affect the growth of microorganisms Performance outcome 4: Identify the use of microorganisms in biotechnological industries</p> <ul style="list-style-type: none"> To describe the factors that can affect microbial growth, such as: temperature, pH, various nutrients, aerobic/anaerobic conditions, sterilisation, irradiation, osmotic potential, commercial antimicrobials e.g. in toothpaste, mouthwash and natural antimicrobials e.g. garlic, honey. To describe the main features of batch processing and continuous processing in the biotechnological industry To outline the use of bacteria and fungi in the biotechnology industry, selecting microbes that are used in at least 2 of these industries: food technology, enzyme production, energy resources, sewage treatment or bioremediation To describe how bacteria can be used in the process of genetic engineering and apply this knowledge to a named biotechnology process <p><u>Key Skills – Teacher 2 Assignment 2</u></p> <ol style="list-style-type: none"> To use a haemocytometer to estimate the population of yeast cells To produce lawn plates and assess the effects of antibiotics on a named bacterium To perform a serial dilution technique of a named bacteria To use secondary sources of data and research to substantiate practical findings To produce a scientific report on practical findings and make recommendations for improvements to practical techniques. 		<p>Supporting texts or wider reading</p> <p>Advanced level Biology textbooks, internet and scientific journal papers all need to be used to research microbe structure and function, and factors affecting growth of microbes</p>
		<p>Opportunities for extended writing</p> <p>Full practical report written including practical details, results, risk assessments and research evidence</p>
		<p>Speak like an expert</p> <p>Scientific report using keywords and knowledge to justify outcomes. Group practical work can be carried out, but individual results must be submitted for assessment</p>
		<p>Links to careers, personal development and other subject areas.</p> <p>Mathematics Use of standard form for bacterial cell counts Micrometry and conversions using a scale Tabulation of repeated data and calculation of mean values Scatter and line graphs Standard Deviation and standard error calculations</p> <p>ICT Use of Excel to produce tables of repeated data and generate calculations such as mean, standard deviation and standard error Production of scatter graphs and bar graphs to analyse results</p> <p>Health and Safety</p>



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		Production of full risk assessments outlining hazards and ways to control the hazard
HALF TERM 5: SUBMISSION DEADLINE 15th May 2025 for coursework units: <ul style="list-style-type: none"> • Unit 6: Microbiology • Unit 5: Investigating Science – Electrochemical Cells (Resit) • Unit 2: Applied Experimental Techniques (Resit) 		Supporting texts or wider reading
		Opportunities for extended writing
		Speak like an expert
		Links to careers, personal development and other subject areas.
HALF TERM 6: Resit examinations for: <ul style="list-style-type: none"> • Unit 1: Key Concepts in Science • Unit 3: Science in the Modern World • Unit 4: The Human Body 		Supporting texts or wider reading
		Opportunities for extended writing
		Speak like an expert
		Links to careers, personal development and other subject areas.