

Applied Science BTEC at Samuel Whitbread Academy
Curriculum Sequencing

Year 12:

Course	Year	Term	Big Ideas	Subject Learning Checklist
Applied Science BTEC Extended Certificate	12	Term 1 - 35 hours (Units taught simultaneously)	Unit 1 - Structure and bonding in applications in science	Understand the electronic structure of atoms Understand ionic bonding Understand covalent bonding Understand metallic bonding Understand the following intermolecular forces: van der Waals, dipole-dipole, hydrogen bonding Quantitative Chemistry Quantities in Chemistry
			Unit 1 - Production and uses of substances in relation to properties	The Periodic Table (Period, Groups, Layouts) Understand the physical properties of elements: first ionisation energy, electron affinity, atomic/ionic radius, electronegativity, trends Understand the chemical properties of elements: products and reactivity, oxidation, reduction, displacement reactions.
			Unit 1 - Cell structure and function	Cell Theory Ultrastructure and Function of Eukaryotic, Prokaryotic and Bacterial. Recognise cells from electron micrograph Gram-positive and gram-negative bacteria. Magnification calculation
			Unit 1 - Cell specialisation	Palisade mesophyll cells in a leaf Sperm and egg cells in reproduction Root hair cells in plants White blood cells

				Red blood cells.
			Unit 1 - Tissue structure and function	<p>Understand the structure and function of epithelial tissue</p> <p>Understand the structure and function of endothelial tissue</p> <p>Understand the structure and function of muscular tissue</p> <p>Understand the structure and function of nervous tissue</p>
		Term 2 30 hours	Unit 1 - Working with waves	<p>Understand the features common to all waves</p> <p>Graphical representation of wave features</p> <p>Understand the difference between transverse and longitudinal waves</p> <p>Understand concepts of displacement, coherence, path difference, phase difference, superposition as applied to diffraction gratings</p> <p>Understand the industrial application of diffraction gratings (emission spectra & identifying gases)</p> <p>$v f = \lambda$</p> <p>Understand the concept and applications of stationary waves</p> <p>resonance</p> <p>Musical Instruments</p> <p>calculation of speed $v = \sqrt{\frac{T}{\mu}}$</p>
			Unit 1 - Waves in communication	<p>Understand the principles of fibre optics</p> <p>refractive index $n = \frac{c}{v} = \frac{\sin i}{\sin r}$</p> <p>total internal reflection</p> <p>calculation of critical angles at a glass–air interface:</p> <p>$\sin c = \frac{1}{n}$</p> <p>Understand the applications of fibre optics in medicine to include endoscopes</p> <p>Understand the applications of fibre optics in communication, to include: analogue and digital signals: analogue-to-digital conversion, broadband.</p>

			Unit 1 - Use of electromagnetic waves in communication	<p>Understand that all electromagnetic waves travel with the same speed in a vacuum</p> <p>Be able to use the inverse square law in relation to the intensity of a wave:</p> $I = \frac{k}{r^2}$ <p>Understand how the regions of the electromagnetic spectrum are grouped according to the frequency.</p> <p>Understand how the applications of electromagnetic waves in communications are related to frequency, including: Satellite communication, mobile phones, Bluetooth, infrared, Wi-Fi.</p>
			Unit 2 - Undertake titration and colorimetry to determine the concentration of solutions	<p>Practical and Coursework</p> <p>Laboratory equipment and its calibration</p> <p>Preparation and standardisation of solutions using titration</p> <p>Colorimetry</p>
			Unit 2 - Undertake calorimetry to study cooling curves	<p>Practical and Coursework</p> <p>Thermometers</p> <p>Cooling curves</p>
		Term 3 30 hours	Unit 2 - Undertake chromatographic techniques to identify components in mixtures	<p>Practical and Coursework</p> <p>Chromatographic techniques</p> <p>Application of chromatography</p> <p>Interpretation of a chromatogram</p>
		(Units taught simultaneously)	Unit 2 - Review personal development of scientific skills for laboratory work	<p>Practical and Coursework</p> <p>Personal responsibility</p> <p>Interpersonal skills</p> <p>Professional practice</p>

Year 13:

Course	Year	Term	Big Ideas	Subject Learning Checklist
<p>Applied Science BTEC Extended Certificate</p>	<p>13</p>	<p>Term 1 35 hours</p> <p>(Units taught simultaneously)</p>	<p>Unit 8 - Learning aim A: Understand the impact of disorders of the musculoskeletal system and their associated corrective treatments</p>	<p>Coursework</p> <p>Explain the functional role of the musculoskeletal system in the human body.</p> <p>Describe the effect of disorder of muscles and joints and possible corrective treatment(s).</p> <p>Compare how disorders of the musculoskeletal system can affect how muscles bring about movement of joints and the role of corrective treatment(s).</p> <p>Evaluate the effect of corrective treatment(s) associated with a musculoskeletal disorder.</p>
			<p>Unit 8 - Learning aim B: Understand the impact of disorders on the physiology of the lymphatic system and the associated corrective treatments</p>	<p>Coursework</p> <p>Describe the gross anatomy and function of the organs of the lymphatic system.</p> <p>Describe the effect of a disorder on the lymphatic system and possible corrective treatment(s).</p> <p>Explain the physiological reasoning for corrective treatment(s) associated with a disorder of the lymphatic system.</p> <p>Evaluate the effect of corrective treatment(s) for a disorder of the lymphatic system.</p>
			<p>Unit 3</p> <p>Planning a scientific investigation</p> <p>Data collection, processing and analysis/interpretation</p> <p>Drawing conclusions and evaluation</p>	<p><u>Enzymes</u></p> <p>Protein Structure</p> <p>Enzymes as biological catalysts in chemical reactions</p> <p>Factors that can affect enzyme activity</p> <p><u>Diffusion of molecules</u></p> <p>Factors affecting the rate of diffusion</p> <p>Arrangement and movement of molecules</p>

		Term 2 30 hours (Units taught simultaneously)	Learning aim C: Explore the physiology of the digestive system and the use of corrective treatments for dietary related diseases	<p style="text-align: center;">Coursework</p> <p>Explain the role and location of organs involved in digestion.</p> <p>Correctly carry out investigations to establish sources and importance of key nutrients for a balanced diet.</p> <p>Describe the symptoms of nutrient deficiency as a result of dietary-related disease</p> <p>Analyse the role of digestive enzymes on nutrient uptake in each part of the digestive system.</p> <p>Explain the use of corrective treatment(s) for nutrient deficiency.</p> <p>Evaluate the effect of dietary disease and corrective treatment(s) on human health.</p>
			<p style="text-align: center;">Unit 3</p> <p style="text-align: center;">Planning a scientific investigation</p> <p>Data collection, processing and analysis/interpretation</p> <p style="text-align: center;">Drawing conclusions and evaluation</p>	<p style="text-align: center;"><u>Plants and their environment</u></p> <p>Factors that can affect plant growth and/or distribution</p> <p style="text-align: center;">Sampling techniques</p> <p style="text-align: center;">Sampling sizes</p> <p style="text-align: center;"><u>Electrical circuits</u></p> <p>Use of electrical components in series and parallel circuits</p> <p style="text-align: center;">Equations</p> <p style="text-align: center;">Energy Usage</p>
		Term 3 Up until May Half term	<p style="text-align: center;">Unit 3</p> <p style="text-align: center;">Planning a scientific investigation</p> <p>Data collection, processing and analysis/interpretation</p> <p style="text-align: center;">Drawing conclusions and evaluation</p>	<p style="text-align: center;"><u>Energy content of fuels</u></p> <p style="text-align: center;">Fuels</p> <p style="text-align: center;">Hazards associated with fuels</p> <p style="text-align: center;">Units of energy</p>