

**Subject: BTec Applied Science**
**Year group: 12**

Topic	Unit 1: Principles and Applications of Science			Unit 2: Practical Scientific Procedures and Techniques
	Biology - Structure and functions of cells and tissues	Chemistry - Periodicity and properties of elements	Physics - Waves in communication	
<b>Prior Knowledge</b>	<ul style="list-style-type: none"> <li>● Key Concepts in Biology</li> <li>● Cells and Control</li> <li>● Health Disease and the Development of Medicines</li> </ul>	<ul style="list-style-type: none"> <li>● Atomic Structure, Periodic table, Types of Bonding &amp; Structure</li> <li>● Calculations involving masses</li> </ul>	<ul style="list-style-type: none"> <li>● Waves</li> <li>● Light and EM Spectrum</li> </ul>	<ul style="list-style-type: none"> <li>● Working scientifically skills</li> <li>● States of matter&amp; Separation Techniques</li> <li>● Acids and Alkalis</li> </ul>
<b>Knowledge</b>	<p><b>B1 Cell structure and function</b></p> <ul style="list-style-type: none"> <li>● Understand the structure and function of organelles in cells</li> <li>● Use of light microscopes.</li> <li>● Understand the similarities and differences between plant and animal cell</li> <li>● Distinguish between gram-positive and gram-negative</li> </ul> <p><b>B2 Cell specialisation</b></p> <ul style="list-style-type: none"> <li>● Understand cell specialisation</li> </ul> <p><b>B3 Tissue structure and function</b></p> <ul style="list-style-type: none"> <li>● Understand the structure and function of epithelial tissue, endothelial tissue, muscular tissue, nervous tissue</li> </ul>	<p><b>A1 Structure and bonding in applications in science</b></p> <ul style="list-style-type: none"> <li>● Understand the electronic structure of atoms</li> <li>● Understand ionic, covalent and metallic bonding</li> <li>● Understand intermolecular forces</li> <li>● Calculations involving masses</li> </ul> <p><b>A2 Production and uses of substances in relation to properties</b></p> <ul style="list-style-type: none"> <li>● Understand key physical properties of elements and periodicity</li> <li>● Understand the chemical properties of elements, redox reactions, neutralisation reactions and displacement reactions</li> </ul>	<p><b>C1 Working with waves</b></p> <ul style="list-style-type: none"> <li>● Understand wave features and the difference between transverse and longitudinal</li> <li>● Discuss the application of diffraction gratings</li> <li>● Be able to use the wave equation (<math>v f = \lambda</math>)</li> </ul> <p><b>C2 Waves in communication</b></p> <ul style="list-style-type: none"> <li>● Understand the principles and applications of fibre optics</li> </ul> <p><b>C3 Use of electromagnetic waves in communication</b></p> <ul style="list-style-type: none"> <li>● Understand the speed, energy and frequency of EMS waves and their applications</li> <li>● Be able to use the inverse square law in relation to the intensity of a wave</li> </ul>	<p><b>Learning aim A: Undertake titration and colorimetry to determine the concentration of solutions</b></p> <p>A1 Laboratory equipment and its calibration</p> <p>A2 Preparation and standardisation of solutions using titration</p> <p>A3 Colorimetry</p> <p><b>Learning aim B: Undertake calorimetry to study cooling curves</b></p> <p>B1 Thermometers</p> <p>B2 Cooling curves</p> <p><b>Learning aim C: Undertake chromatographic techniques to identify components in mixtures</b></p> <p>C1 Chromatographic techniques</p> <p>C2 Application of chromatography</p> <p>C3 Interpretation of a chromatogram</p> <p><b>Learning aim D: Review personal development of scientific skills for laboratory work</b></p> <p>D1 Personal responsibility</p> <p>D2 Interpersonal skills</p> <p>D3 Professional practice</p>
<b>Math Skills</b>	<ul style="list-style-type: none"> <li>● Calculate magnification and size of cells and organelles from drawings or images</li> </ul>	<ul style="list-style-type: none"> <li>● moles, molar masses and molarities, mass, volume of solution, concentration, reacting quantities &amp; percentage yields</li> </ul>	<ul style="list-style-type: none"> <li>● Use of wave equation</li> <li>● Calculation of speed, critical angle, refractive index, wave intensity</li> </ul>	<ul style="list-style-type: none"> <li>● plots of pH versus volume and <math>\Delta pH/\Delta \text{volume}</math> versus volume</li> <li>● Calculation of concentrations &amp; use of Beer-Lambert law</li> <li>● Calibration curves and graph tangents</li> <li>● Interpretation of cooling curves</li> <li>● Calculation of Rf values</li> </ul>
<b>Assessment Pattern</b>	1 x interim tests (30 marks) 1 x mock (90 marks)			Assignment A Assignment B Assignment C Assignment D

Topic	Unit 3: Science Investigation Skills			Unit 8: Physiology of Human Body Systems
<b>Prior Knowledge</b>	<ul style="list-style-type: none"> <li>Working Scientifically</li> <li>Key Concepts in Biology</li> <li>Plant Structures and their functions</li> <li>Fuels</li> <li>Electricity</li> <li><b>From KS5: Unit 2:</b> Practical Scientific Procedures and Techniques</li> </ul>			Cells and Control Health Disease and the Development of Medicines Exchange and Transport in Animals
<b>Knowledge</b>	<b>A Planning a scientific investigation</b> A1 Developing a hypothesis for an investigation A2 Selection of appropriate equipment, techniques and standard procedures A3 Health and safety associated with the investigation A4 Variables in the investigation A5 Method for data collection and analysis <b>B Data collection, processing and analysis/interpretation</b> B1 Collection of quantitative/qualitative data B2 Processing data	<b>C Drawing conclusions and evaluation</b> C1 Interpretation/analysis of data C2 Evaluation <b>D Enzymes in action</b> D1 Protein structure D2 Enzymes as biological catalysts in chemical reactions D3 Factors that can affect enzyme activity <b>E Diffusion of molecules</b> E1 Factors affecting the rate of diffusion E2 Arrangement and movement of molecules	<b>F Plants and their environment</b> F1 Factors that can affect plant growth and/or distribution F2 Sampling techniques F3 Sampling sizes <b>G Energy content of fuels</b> G1 Fuels G2 Hazards associated with fuels G3 Units of energy <b>H Electrical circuits</b> H1 Use of electrical symbols to design circuits H2 Equations H3 Energy usage	<b>Learning aim A: Understand the impact of disorders of the musculoskeletal system and their associated corrective treatments</b> A1 Structure of the musculoskeletal system A2 Function of the musculoskeletal system A3 Health matters and treatments related to the musculoskeletal system <b>Learning aim B: Understand the impact of disorders on the physiology of the lymphatic system and the associated corrective treatments</b> B1 Structure of the lymphatic system B2 Function of the lymphatic system B3 Health matters and treatments related to the lymphatic system <b>Learning aim C: Explore the physiology of the digestive system and the use of corrective treatments for dietary-related diseases</b> C1 Structure of the digestive system C2 Function of the digestive system C3 Health matters and treatments related to the digestive system
<b>Math Skills</b>	<ul style="list-style-type: none"> <li>Be able to collect data accurately/reliably and to appropriate levels of precision.</li> <li>Be able to display data in a clear and logical format using correct headings with units</li> <li>Be able to identify anomalous data and take appropriate action.</li> <li>Be able to calculate mean and standard deviation, use error bars, use of t-test, chi-squared and correlation analysis, use and transposition of formulae, conversion of units, use of standard form and percentage error of measuring equipment.</li> <li>Be able to identify trends/patterns in data.</li> <li>Be able to compare primary and secondary data.</li> <li>Calculate heat energy released from a fuel in kJ mol<sup>-1</sup>, power and work done</li> </ul>			
<b>Assessment Pattern</b>	3 x interim tests (40 marks) 1 x mock (70 marks)			Assignment A Assignment B Assignment C