Key Stage 4 – Year 10 – Triple Science (Physics)
Curriculum Map for Students

| | Year 10 (Physics) | | | | |
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| **Topic Overview** | **SP2 – Motion and Forces**<br><br>**(Paper 1)** | **SP3 – Conservation of Energy**<br><br>**(Paper 1)** | **SP4 – Waves**<br><br>**(Paper 1)** | **SP5 – Light and the Electromagnetic Spectrum (Paper 1)** | **SP6 – Radioactivity**<br><br>**(Paper 1)** |
| **Focus** | Students will study and understand concepts including:<br>• Vector and scalar quantities<br>• Force diagrams<br>• Calculating resultant forces<br>• Newton's First law<br>• Circular Motion<br>• Mass and Weight<br>• Terminal Velocity<br>• Newton's Second Law<br>• Newton's Third Law<br>• Momentum calculations<br>• Conservation of Momentum calculations<br>• Factors affecting stopping distances<br>• Reaction times<br>• Braking distances<br>• Hazards due to crashes<br>• Force calculations from momentum<br>• *Braking distance calculations from energy stores.* | Students will study and understand concepts including:<br>• Energy stores and transfers<br>• Law of conservation of energy<br>• Efficiency calculations<br>• Energy transfers through heating<br>• Thermal conductivity<br>• Gravitational potential energy calculations<br>• Kinetic energy calculations<br>• Sources of non-renewable energy<br>• Reasons for changes of uses of non-renewable energy sources.<br>• Renewable energy sources<br>• Reasons for changes of renewable energy sources. | Students will study and understand concepts including:<br>• Different types of waves<br>• Identifying types of waves<br>• Using correct terminology to describe wave types.<br>• Calculating wave speeds, through distance and time.<br>• Calculating wave speeds, through frequency and wavelength.<br>• Refraction of light through different materials.<br>• Measurement of angles of refraction.<br>• Explanation of the process of refraction.<br>• *Knowing the four different processes that can occur when waves cross boundaries.*<br>• *Discovering how the ear works to detect sound.*<br>• *Stating uses and differences between infrasound and ultrasound.* | Students will study and understand concepts including:<br>• *Drawing ray diagrams.*<br>• *Investigating colour and filters.*<br>• *Explaining how lenses work.*<br>• Discovery of Infrared<br>• Order of the electromagnetic spectrum (frequency and wavelength)<br>• Different parts of the electromagnetic spectrum.<br>• Uses of long wavelengths.<br>• Formation and detection of radio waves<br>• *Explaining how radiation of a body depends on the temperature.*<br>• *Investigating the Earth's energy balance.*<br>• Uses of short wavelengths.<br>• Dangers of electromagnetic waves.<br>• Methods of protection for different electromagnetic waves. | Students will study and understand concepts including:<br>• Atomic models.<br>• Discovery of the nucleus.<br>• Structure of the nucleus.<br>• Definition of isotopes.<br>• Electronic structure in atoms.<br>• How electronic structure can change through electromagnetic excitation.<br>• Emission and Absorption spectra.<br>• Ionisation of atoms.<br>• Sources of background radiation.<br>• Use of Geiger tubes to measure radioactivity.<br>• Types of radiation.<br>• Nuclear decay equations.<br>• Half-life calculations.<br>• Dangers of radioactivity.<br>• *Radioactivity in medicine, and diagnosis.*<br>• *Nuclear fission processes and chain reactions.*<br>• *Nuclear fusion processes.*<br>• *Comparison between fission and fusion.* |
| **Key Equations Learnt** | $W = m \times g$<br>$F = m \times a$<br>$F = \frac{mv - mu}{t}$ | $\Delta GPE = m \times g \times \Delta h$<br>$KE = \frac{1}{2} \times m \times v^2$ | $v = \frac{x}{t}$<br>$v = f \times \lambda$ | | |
| **Assessment** | End of topic assessment (50 marks, 10 marks recall, 10 marks previous topic spaced learning) | | | | |
| | Summer Year 10 Mock (Paper 1) | | | | |

Key Stage 4 – Year 11 – Combined Science
Curriculum Map for Students

| | | | Year 11 (Physics) | | | |
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| **Topic Overview** | **SP7 – Astronomy**<br><br>**(Paper 1)** | **SP8 – Energy – Forces Doing Work**<br>**SP9 – Forces and their effects**<br><br>**(Paper 2)** | **SP10 – Electricity and Circuits**<br><br>**(Paper 2)** | **SP11 – Charges and Static Electricity**<br><br>**(Paper 2)** | **SP12 – Magnetism and the Motor Effect**<br>**SP13 – Electromagnetic Induction**<br><br>**(Paper 2)** | **CP12 – Particle Model**<br>**CP13 – Forces and Matter**<br><br>**(Paper 2)** |
| **Focus** | Students will study and understand concepts including:<br>• *The structure of the solar system.*<br>• *Different bodies in the solar system.*<br>• *Factors affecting gravity.*<br>• *Types of orbits for satellites.*<br>• *Process to change orbit.*<br>• *Star formation process.*<br>• *Life cycle of stars.*<br>• *Red-shift theory.*<br>• *The implications for the galaxy about red shift.*<br>• *Origin of the universe, through steady state theory, and the big bang theory.* | Students will study and understand concepts including:<br>• Calculation of work done on an object that is moving.<br>• Calculation of the power applied to an object through work done.<br>• Contact and non-contact forces.<br>• Vector diagrams of forces.<br>• Free-body force diagrams.<br>• Scale force diagrams.<br>• *Rotational forces, calculating the turning effect of a force.*<br>• *Using moment calculations to determine if an object will be balanced.*<br>• *Explaining of levers and gears transmit rotational effect of forces.* | Students will study and understand concepts including:<br>• Structure of electrical circuits<br>• Series and Parallel circuits<br>• Current and method of measurement in a circuit.<br>• Potential difference and method of measurement in a circuit.<br>• Calculation of charge within a circuit.<br>• Calculation of energy transferred through a charge.<br>• Resistance of components in circuits.<br>• Resistance in series and parallel circuits.<br>• Measurement of resistance through calculation.<br>• VI graphs for resistor, filament lamp, diode, thermistor.<br>• Calculating energy transferred through a component.<br>• Reducing resistance in a wire (simple model).<br>• Calculation of electrical power through a component. | Students will study and understand concepts including:<br>• *How insulators can become charged through friction.*<br>• *Charge by induction.*<br>• *Dangers and uses of static electricity.*<br>• *How Earthing works.*<br>• *Drawing electrical fields.*<br>• *Explaining what the field lines say about the field.*<br>• *Using fields to explain static electrical effects.*<br>• *Uniform and point charge field diagrams.* | Students will study and understand concepts including:<br>• Permanent and temporary magnets.<br>• Drawing magnetic fields around bar magnets.<br>• Describing uniform magnetic fields.<br>• Evidence of the Earth's magnetic field.<br>• Formation of electromagnetism.<br>• Right-hand corkscrew rule to determine the direction of the magnetic field.<br>• Application of magnetic forces.<br>• Use of Fleming's Left-hand Rule.<br>• Calculation of forces in a current carrying wire in a magnetic field.<br>• *Induction of potential difference in a wire through a magnetic field.*<br>• *Split ring commutators and slip rings.* | Students will study and understand concepts including:<br>• Particle model for different states of matter.<br>• Calculation of density.<br>• Energy used to change states of matter.<br>• Calculation of Specific Heat Capacity<br>• Calculation of Specific Latent Heat.<br>• Relationship between gas pressure and temperature.<br>• *Relationship between gas pressure and volume.*<br>• Definition of absolute zero.<br>• Relationship between forces and extension of elastic objects. |

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| | | | • Alternating and Direct current in circuits.<br>• Electrical safety methods in mains electricity. | | • *Microphone and loudspeakers and how they work.*<br>• Uses of transformers.<br>• Description of transformers.<br>• Calculation of unknown values of transformers.<br>• Definition of the national grid.<br>• Electromagnetic induction through a magnet forming a current in a conductor. | • Calculation of force applied to elastic object for an extension.<br>• Calculation of elastic potential energy.<br>• *Pressure in fluids.*<br>• *Pressure and upthrust.*<br>• *Relationship between the volume of an object and the upthrust.*<br>• *Hydrostatic pressure calculations.* |
| **Key Equations Learnt** | | $E = F \times d$<br>$P = \frac{E}{t}$ | $Q = I \times t$<br>$E = Q \times V$<br>$V = I \times R$<br>$E = V \times I \times t$<br>$P = I \times V$<br>$P = I^2 \times R$ | | $F = B \times I \times l$<br>$V_P \times I_P = V_S \times I_S$ | $\rho = \frac{m}{V}$<br>$\Delta Q = m \times c \times \Delta\theta$<br>$Q = m \times L$<br>$P_1 \times V_1 = P_2 \times V_2$<br>$F = k \times x$<br>$E = \frac{1}{2} \times k \times x^2$<br>$P = \frac{F}{A}$<br>$P = h \times \rho \times g$ |
| **Assessment** | | | End of topic assessment (50 marks, 10 marks recall, 10 marks previous topic spaced learning) | | | |
| | | | Winter Year 11 Mock (Paper 1)<br>Spring Year 11 Mock (Paper 2) | | | |