Physics Curriculum Overview – Year 12

Sequencing of topics	What knowledge will students develop? (Including key terminology)	What skills will students develop? (Including literacy & numeracy)	Assessment opportunities	Homework opportunities	Personal development (Ursuline Values, Catholic Social Teaching, Cultural Capital, Cross-curricular, Careers)	Curriculum links
Autumn Half Term 1						
Measurements and their errors Particles and radiation	○ Use of SI units and their prefixes ○ Limitation of physical measurements ○ Estimation of Physical Quantities ○ Constituents of the atom ○ Stable and unstable nuclei ○ Particles, antiparticles and photons ○ Particle interactions ○ Classification of particles ○ Quarks and antiquarks ○ Applications of conservation laws ○ The photoelectric effect ○ Collisions of electrons with atoms	○ Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts ○ Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences ○ Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena ○ Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment ○ Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations ○ Make and record observations and measurements using a range of apparatus and methods	○ Targeted questioning ○ Mid-topic assessment ○ End of topic assessment	○ Worksheets ○ Flipped learning activities ○ Past exam questions ○ Research ○ Practical write-ups ○ Isaac Physics	○ **Grateful** for waves enabling us to be able to communicate ○ **Discerning** when analysing data presented to us **and joyful** at the possibilities of science ○ **Leading others in pursuit of justice** when planning and carrying out a practical ○ **Service and sacrifice** when we recognise the scientific work that has been done before us ○ **Loving and compassionate** when we consider how scientific advancements can be used to help others	KS1/2 ○ Matter KS3 ○ Atomic structure KS4 ○ Atomic structure ○ Waves KS5

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	○ Energy levels and photon emission ○ Wave-particle duality	○ Evaluate methods and suggest possible improvements and further investigations ○ Presenting observations and other data using appropriate methods ○ Interpreting observations and other data (presented in verbal, diagrammatic, graphical, symbolic or numerical form), including identifying patterns and trends, making inferences and drawing conclusions ○ Presenting reasoned explanations including relating data to hypotheses ○ Being objective, evaluating data in terms of accuracy, precision, repeatability and reproducibility and identifying potential sources of random and systematic error ○ Use scientific vocabulary, terminology and definitions ○ Recognise the importance of scientific quantities and understand how they are determined ○ Use SI units (eg kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate ○ Use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano) ○ Interconvert units ○ Use an appropriate number of significant figures in calculation			○ **Dignity of God's people** ○ **Community and participation** ○ **Care for creation** ○ **Dignity in work** ○ **Peace and reconciliation** ○ **Solidarity** ○ **Personal** ○ **Social** ○ **Moral** ○ **Cultural** ○ **Art** ○ **Geography** ○ **Maths**	

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Autumn Half Term 2						
Waves	○ Progressive waves ○ Longitudinal and transverse waves ○ Principle of superposition of waves and formation of stationary waves ○ Interference ○ Diffraction ○ Refraction at a plane surface	○ Understand how scientific methods and theories develop over time ○ Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts ○ Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences ○ Use scientific theories and explanations to develop hypotheses ○ Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena ○ Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment ○ Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations	○ Targeted questioning ○ Mid-topic assessment ○ End of topic assessment	○ Worksheets ○ Flipped learning activities ○ Past exam questions ○ Research ○ Practical write-ups ○ Isaac Physics	○ **United in harmony** when planning and carrying out a practical ○ **Discerning** when analysing data **and joyful** at the possibilities of science ○ **Leading others in pursuit of justice** when planning and carrying out a practical ○ **Service and sacrifice** when we recognise the scientific work that has been done before us ○ **Care for creation** ○ **Community and participation** ○ **Dignity of God's people** ○ **Solidarity** ○ **Personal** ○ **Social** ○ **Physical** ○ **Moral**	KS1/2 ○ Light and sound KS3 ○ Waves KS4 ○ Waves KS5

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		○ Make and record observations and measurements using a range of apparatus and methods ○ Evaluate methods and suggest possible improvements and further investigations ○ Presenting observations and other data using appropriate methods ○ Interpreting observations and other data (presented in verbal, diagrammatic, graphical, symbolic or numerical form), including identifying patterns and trends, making inferences and drawing conclusions ○ Presenting reasoned explanations including relating data to hypotheses ○ Being objective, evaluating data in terms of accuracy, precision, repeatability and reproducibility and identifying potential sources of random and systematic error ○ Use scientific vocabulary, terminology and definitions ○ Recognise the importance of scientific quantities and understand how they are determined ○ Use SI units (eg kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate ○ Use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano) ○ Interconvert units			○ **Cultural** ○ **Geography** ○ **PE** ○ **Food Tech** ○ **Maths**	

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		○ Use an appropriate number of significant figures in calculation				

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Spring Half Term 1						
Mechanics and materials	○ Scalars and vectors ○ Moments ○ Motion along a straight line ○ Projectile motion ○ Newton's laws of motion ○ Momentum ○ Work, energy and power ○ Conservation of energy ○ Bulk properties of solids ○ The Young modulus	○ Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts ○ Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences ○ Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena ○ Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment ○ Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations ○ Make and record observations and measurements using a range of apparatus and methods ○ Evaluate methods and suggest possible improvements and further investigations	○ Targeted questioning ○ Mid-topic assessment ○ End of topic assessment	○ Worksheets ○ Flipped learning activities ○ Past exam questions ○ Research ○ Practical write-ups ○ Isaac Physics	○ **Grateful** for waves enabling us to be able to communicate ○ **Discerning** when analysing data presented to us **and joyful** at the possibilities of science ○ **Leading others in pursuit of justice** when planning and carrying out a practical ○ **Service and sacrifice** when we recognise the scientific work that has been done before us ○ **Loving and compassionate** when we consider how scientific advancements can be used to help others ○ **Dignity of God's people**	KS1/2 ○ Forces ○ Materials KS3 ○ Forces KS4 ○ Forces KS5

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Spring Half Term 2						
Electricity	○ Basics of electricity ○ Current-voltage characteristics ○ Resistivity ○ Circuits ○ Potential divider ○ Electromotive force and internal resistance	○ Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts ○ Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences ○ Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena ○ Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment ○ Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations ○ Make and record observations and measurements using a range of apparatus and methods ○ Evaluate methods and suggest possible improvements and further investigations	○ Targeted questioning ○ Mid-topic assessment ○ End of topic assessment	○ Worksheets ○ Flipped learning activities ○ Past exam questions ○ Research ○ Practical write-ups ○ Isaac Physics	○ **Grateful** for waves enabling us to be able to communicate ○ **Discerning** when analysing data presented to us **and joyful** at the possibilities of science ○ **Leading others in pursuit of justice** when planning and carrying out a practical ○ **Service and sacrifice** when we recognise the scientific work that has been done before us ○ **Loving and compassionate** when we consider how scientific advancements can be used to help others ○ **Dignity of God's people**	KS1/2 ○ Circuits KS3 ○ Electricity KS4 ○ Electricity

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Summer Term						
Thermal physics Periodic motion	○ Thermal energy transfer ○ Ideal gases ○ Molecular kinetic theory model ○ Circular motion ○ Simple harmonic motion (SHM) ○ Simple harmonic systems ○ Forced vibrations and resonance	○ Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts ○ Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences ○ Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena ○ Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment ○ Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations ○ Make and record observations and measurements using a range of apparatus and methods ○ Evaluate methods and suggest possible improvements and further investigations	○ Targeted questioning ○ Past papers	○ Worksheets ○ Flipped learning activities ○ Past exam questions ○ Research ○ Practical write-ups ○ Isaac Physics	○ **Grateful** for waves enabling us to be able to communicate ○ **Discerning** when analysing data presented to us **and joyful** at the possibilities of science ○ **Leading others in pursuit of justice** when planning and carrying out a practical ○ **Service and sacrifice** when we recognise the scientific work that has been done before us ○ **Loving and compassionate** when we consider how scientific advancements can be used to help others ○ **Dignity of God's people**	KS1/2 ○ Energy ○ Forces KS3 ○ Energy ○ Forces KS4 ○ Energy ○ Forces

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