A Level AQA Physics Year 12 Curriculum Map

Notre Dame Catholic College

YEAR 11	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Curriculum Content	**TEACHER A** **3.1 COMPOSITE 1: Measurements and their errors** **Understand the specified fundamental (base) units of measurement and how to carry out reasonable estimations. Have an awareness of the nature of measurement errors and their numerical treatment.** **3.1.1 Component 1**: recognise that a system of measurement depends on the selection of several base units. Recall the base units of the SI system and name and use standard prefixes. Convert between different units for the same quantity. **3.1.2 Component 2:** estimate uncertainties in measurements and calculate fractional and percentage uncertainties. Combine absolute and percentage uncertainties and use error bars on graphs to estimate uncertainties in gradients and intercepts. **3.1.3 Component 3**: make order of magnitude estimates. **3.2.1 COMPOSITE 2: Particles and Radiation** **Understand the importance of international collaboration in the development of new theories and experiments in this area of fundamental research (matter, EM radiation and quantum phenomena).** **3.2.1.1 Component 1:** describe the model of the atom and calculate specific charge. **3.2.1.2 Component 2:** explain the role of the strong nuclear force and write equations for alpha and beta decay including the need for the neutrino. **3.2.1.3 Component 3:** compare masses, charge and rest energy for particles and antiparticles. Describe the photon model of electromagnetic radiation and the energies involved in annihilation and pair production. **TEACHER B** **3.4.1 COMPOSITE 4: Mechanics and Materials** **Understand the nature of scalars and vectors and consider materials in terms of their bulk properties and tensile strength.** **3.4.1.1 Component 1**: add and resolve vectors. **3.4.1.2 Component 2:** use the principle of moments to calculate the moment of a force about a point.	**TEACHER A** **3.2.1 COMPOSITE 2: Particles and Radiation** **Understand the importance of international collaboration in the development of new theories and experiments in this area of fundamental research (matter, EM radiation and quantum phenomena).** **3.2.1.4 Component 4**: use the concept of exchange particles to explain forces between elementary particles. **3.2.1.5 Component 5**: classify particles. **3.2.1.6 Component 6**: describe the properties of quarks and antiquarks. **3.2.1.7 Component 7**: apply the conservation laws for charge, baryon number, lepton number and strangeness to particle interactions. **TEACHER B** **3.4.1 COMPOSITE 4: Mechanics and Materials** **Understand the nature of scalars and vectors and consider materials in terms of their bulk properties and tensile strength.** **3.4.1.5 Component 5**: know and apply Newton's three laws of motion. **3.4.1.6 Component 6**: define momentum, impulse and discuss the conservation of linear momentum, and apply it in calculations involving collisions in one dimension. **3.4.1.7 Component 7**: calculate work done, power and efficiency. **3.4.1.8 Component 8**: recall the principle of the conservation of energy and calculate kinetic and gravitational potential energy.	**TEACHER A** **3.2.2 COMPOSITE 2-part b: Electromagnetic radiation and quantum phenomena** **3.2.2.1 Component 8**: use the photoelectric equation. **3.2.2.2 Component 9**: understand ionisation and excitation in the fluorescent tube and convert eV into J and vice versa. **3.2.2.3 Component 10**: describe how line spectra is used as evidence for transitions between discrete energy levels in atoms. **3.2.2.4 Component 11**: discuss the photoelectric effect and how it provides the evidence of the dual nature of light. Calculate the wavelength of a particle using the de Broglie equation. **TEACHER B** **3.4.2 COMPOSITE 4-part b: Materials** **Understand the nature of scalars and vectors and consider materials in terms of their bulk properties and tensile strength.** **3.4.2: Materials** **3.4.2.1 Component 9**: define density and states Hooke's law. Apply the force extension equation and recognise that the constant, k, is known as the stiffness or the spring constant. **3.4.2.2 Component 10**: define the Young modulus, use it in calculations and describe a method to determine the Young modulus. **Required Practical 4**: Determination of the Young modulus by a simple method.	**TEACHER A** **3.3.1 COMPOSITE 3: Waves** **Understand the characteristics, properties, and applications of travelling and stationary waves.** **3.3.1.1 Component 1**: define the terms frequency, period, amplitude and wavelength of a wave. Use the wave speed equation and explain what is meant by phase and phase difference. **3.3.1.2 Component 2**: distinguish between transverse and longitudinal waves and describe the polarisation of transverse waves. **3.3.1.3 Component 3**: explain what is meant by a stationary wave and use graphs to demonstrate the formation of standing waves. **Required Practical 1:** Investigation into the variation of the frequency of stationary waves on a string with length, tension and mass per unit length of the string. **TEACHER B** **3.5.1 COMPOSITE 5: Electricity** **Understand the many electrical applications that are important to society.** **3.5.1.1 Component 1:** apply knowledge and understanding of electric current, potential difference and resistance. **3.5.1.2 Component 2:** interpret current – voltage graphs and distinguish between the characteristics for an ohmic conductor, a semiconductor diode and a filament lamp. **3.5.1.3 Component 3:** define resistivity and use the resistivity equation in calculations. **Required Practical 5**: Determination of resistivity of a wire using a micrometer, ammeter and voltmeter.	**TEACHER A** **3.3.2 COMPOSITE 3-part b: Refraction, diffraction and interference** **3.3.2.1 Component 4**: describe the Young's double slit experiment and calculate fringe spacing using data from the experiment. **3.3.2.2 Component 5**: describe the diffraction patterns produced using a single slit with monochromatic light and contrast this with the pattern produced by white light. **3.3.2.3 Component 6**: use Snell's law to calculate angles when light crosses a boundary between two media, and calculate critical angles. **TEACHER B** **3.5.1 COMPOSITE 5: Electricity** **Understand the many electrical applications that are important to society.** **3.5.1.4 Component 4:** analyse circuits involving combinations of cells in series and identical cells in parallel. **3.5.1.5 Component 5:** describe how variable resistors, light dependent resistors and thermistors can be used in potential divider circuits. **3.5.1.6 Component 6:** determine the internal resistance of a cell by measuring the terminal pd when the cell is connected to an external resistor with variable resistance. **Required practical 6:** Investigation of the emf and internal resistance of electric cells and batteries by measuring the variation of the terminal pd of the cell with current in it.	EXAM PREPARATION AND REVISION END OF YEAR ASSESSMENTS

	3.4.1.3 Component 3: calculate displacement, speed, velocity and acceleration using the equations for uniform acceleration and analyse and draw graphs of motion. Required Practical 3: Determination of g by a freefall method. **3.4.1.4 Component 4:** explain how the motion of a projectile can be analysed by treating its horizontal and vertical motion independently.					
Prior knowledge and skills (from previous year / key stage)	Students will have a working knowledge of the specified fundamental (base) units of measurement and the ability to rearrange and convert units from GCSE mathematics and science. Pupils will have prior practical skills and an awareness of the nature of measurement errors and of their numerical treatment. Students will have studied the fundamental properties of matter, and electromagnetic radiation.	Students will have studied alpha, beta and gamma radiation in GCSE physics year 2. They should have written nuclear decay equations for alpha and beta decay. During GCSE year 2 pupils will have completed a unit on forces and started off by looking at various scalar and vector quantities. Pupils should have skills at resolving vectors using numerical calculations and protractors.	Students will have studied materials in the forces and elasticity section of GCSE physics year 2 forces unit. Pupils should be able to recall Hooke's law and be able to draw and analyse graphs identifying a materials limit of proportionality and elastic limit. Pupils should be able to plot force-extension graphs. The GCSE required practical how forces affect the extension of a spring will have also been completed and students should have a knowledge of using related calculations.	GCSE studies of wave phenomena are extended through a development of knowledge of the characteristics, properties, and applications of travelling waves and stationary waves. Topics treated include refraction, diffraction, superposition and interference. Students will have studied waves in GCSE physics year 2 and should have an awareness of the properties of transverse waves including reflection, refraction, absorption and transmission.		
Core Knowledge Organiser content	Measurements and their errors Particles and radiation Mechanics and Materials	Particles and Radiation Mechanics and their Materials	Electromagnetic Radiation and Quantum Phenomena Materials	Waves Electricity	Waves Electricity	
Assessment Components	**AO1:** Demonstrate knowledge and understanding of: 1) scientific ideas 2) scientific techniques and procedures. **AO2:** Apply knowledge and understanding of: 1) scientific ideas 2) scientific enquiry, techniques and procedures. **AO3:** Analyse information and ideas to: 1a) interpret 1b) evaluate 2a) make judgements 2b) draw conclusions 3a) develop experimental procedures 3b) improve experimental procedures.	**AO1:** Demonstrate knowledge and understanding of: 1) scientific ideas 2) scientific techniques and procedures. **AO2:** Apply knowledge and understanding of: 1) scientific ideas **AO3:** Analyse information and ideas to: 1a) interpret 1b) evaluate 2a) make judgements 2b) draw conclusions 3a) develop experimental procedures 3b) improve experimental procedures.	**AO1:** Demonstrate knowledge and understanding of: 1) scientific ideas 2) scientific techniques and procedures. **AO2:** Apply knowledge and understanding of: 1) scientific ideas 2) scientific enquiry, techniques and procedures. **AO3:** Analyse information and ideas to: 1a) interpret 1b) evaluate 2a) make judgements 2b) draw conclusions 3a) develop experimental procedures 3b) improve experimental procedures.	**AO1:** Demonstrate knowledge and understanding of: 1) scientific ideas 2) scientific techniques and procedures. **AO2:** Apply knowledge and understanding of: 1) scientific ideas 2) scientific enquiry, techniques and procedures. **AO3:** Analyse information and ideas to: 1a) interpret 1b) evaluate 2a) make judgements 2b) draw conclusions 3a) develop experimental procedures 3b) improve experimental procedures.	**AO1:** Demonstrate knowledge and understanding of: 1) scientific ideas 2) scientific techniques and procedures. **AO2:** Apply knowledge and understanding of: 1) scientific ideas 2) scientific enquiry, techniques and procedures. **AO3:** Analyse information and ideas to: 1a) interpret 1b) evaluate 2a) make judgements 2b) draw conclusions 3a) develop experimental procedures 3b) improve experimental procedures.	**AO1:** Demonstrate knowledge and understanding of: 1) scientific ideas 2) scientific techniques and procedures. **AO2:** Apply knowledge and understanding of: 1) scientific ideas 2) scientific enquiry, techniques and procedures. **AO3:** Analyse information and ideas to: 1a) interpret 1b) evaluate 2a) make judgements 2b) draw conclusions 3a) develop experimental procedures 3b) improve experimental procedures.

Vocabulary / Key Subject Terminology						
Assessment 1	Teacher Assessment (Mechanics) and End of Unit Test (Particles and Radiation) RP work assessed and recorded using externally provided exam board tracker for each component	Teacher Assessment (Particles and Radiation) and AP1 Assessment (Particles and Radiation and Mechanics)	Teacher Assessment and End of Unit Test (Electromagnetic Radiation and Quantum Phenomena) RP work assessed and recorded using externally provided exam board tracker for each component	Teacher Assessment and AP2 Assessment RP work assessed and recorded using externally provided exam board tracker for each component	Teacher Assessment and End of Unit Test RP work assessed and recorded using externally provided exam board tracker for each component	AS Assessments (End of Year Summer Exams AP3)
Assessment 2	Mini Quiz	Mini Quiz End of Unit Tests	Mini Quiz End of Unit Test (Materials)	Practice Exam Questions	Practice Papers	
Cross Curricular Links with other Faculties	Mechanics in mathematics A level	Mechanics in mathematics A level	Mechanics in mathematics A level			
Extra-Curricular Offer						
Time Allocation						