SSIS Scope and Sequence

G12 IBDP HL/SL Physics

Overview

→ Averaging 19 weeks per semester (38 weeks per year)
→ End of semester varies dependent upon Chinese New Year – Units may need to be moved accordingly

		Aug	September				October				November				December			January		
month																				
week		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
SEM. 1	HL + SL	Topic 7: Atomic and Nuclear Physics + Topic 13 / Option B: Quantum Physics and Nuclear Physics								Topic 8: Energy, Power and Climate Change							Option E: Astrophysics			
	HL	Topic 10: Thermal Physics					Topic 11: Wave Phenomena						Topic 12: Electromagnetic Induction					Topic 14: Digital Technology		

		Feb.	March				April				May				June			
month																		
week		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
SEM. 2	HL + SL	Option E: Astro		Rev.	Mocks		Revision				EXAMS							
	HL	Topic 14: Digital Tech.																

Grade 12 IB Physics

Unit of Work	SSIS OILs	IB Framework	Unit Skills, Content or Knowledge	Common Assessments
Topic 7: Atomic & Nuclear Physics		**ToK Link:** Correlation & cause Risk Assessment Moral, Social and Environmental aspects	**Unit Question(s)** **1. Content Focus:** • Atomic Structure • Energy Levels • Nuclear Structure • Radioactivity • Ionizing radiation • Half-Life • Nuclear Reactions • Fission and Fusion • The quantum nature of radiation • Wave nature of matter • Atomic Spectra and Energy States **2. Essential knowledge**: **3. Key skills:** • Experimental Design • Data Collection & Processing • Writing Conclusions and Evaluations	**Tests:** End of Unit Test **Practicals:** Radioactivity Simulations
Topic 8: Energy, Power and Climate Change		**TOK Links:** Importance of computer modeling – new models of research in Physics International	**Unit Question(s)** **1. Content Focus:** • Solar Radiation • Albedo • Greenhouse Effect, Gases and Mechanisms • Blackbody Radiation	**Tests:** End of Unit Test **Practicals:**

		collaboration in science.	• Surface Heat Capacity • Global Warming – Models and Mechanisms • Coefficient of Volume Expansion • Sea-Level Rise • Solutions to the enhanced greenhouse effect **2. Essential knowledge**: **3. Key skills:** • Experimental Design • Data Collection & Processing • Writing Conclusions and Evaluations	
Topic 10: Thermal Physics		**TOK Links:** Models in Physics – (link to Ideal Gases)	**Unit Question(s)** **1. Content Focus:** • Ideal Gas • Absolute Zero / Kelvin • Equation of State • First law of Thermodynamics • Isochoric, isobaric, isothermal, adiabatic • P-V diagrams • State changes • Second Law of Thermodynamics • Natural processes and Entropy **2. Essential knowledge**: **3. Key skills:** • Experimental Design • Data Collection & Processing • Writing Conclusions and Evaluations	**Tests:** End of Unit Test **Practicals:**

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Topic 11: Wave Phenomena		**TOK Links:** The nature of reality	**Unit Question(s)** **1. Content Focus:** • Standing Waves • Doppler Effect • Diffraction (Single Slit) • Resolution • Polarization **2. Essential knowledge**: **3. Key skills:** • Experimental Design • Data Collection & Processing • Writing Conclusions and Evaluations	**Tests:** End of Unit Test **Practicals:** Diffraction of a laser beam
Topic 12: Electromagnetic Induction		**TOK Links:** Risk assessment Limitations of data	**Unit Question(s)** **1. Content Focus:** • Induced EMF • Magnetic Flux and Flux linkage • Faraday's Law • Lenz's Law • Alternating Current • The AC Generator • Peak and RMS values • AC Problems and Ohmic resistors • Transformers • Transmission of Electrical Power **2. Essential knowledge**: **3. Key skills:**	**Tests:** End of Unit Test **Practicals:** Magnetic fields of a solenoid Simple Transformers

			• Experimental Design • Data Collection & Processing • Writing Conclusions and Evaluations	
Topic 14: Digital Technology		**TOK Links:** Analogue and Digital – the nature of reality Implications of storage capacity on society	**Unit Question(s)** **1. Content Focus:** • Binary and Decimal Numbers • Storage in Analogue and Digital • CDs and the interference of light • Storage Capacity of CDs and DVDs • Advantages of Digital • Capacitance • CCDs • Quantum Efficiency • Advantages and problems of CCDs **2. Essential knowledge**: **3. Key skills:** • Experimental Design • Data Collection & Processing • Writing Conclusions and Evaluations	**Tests:** End of Unit Test **Practicals:**
Option E: Astrophysics		**TOK Links:** Ways of Knowing	**Unit Question(s)** **1. Content Focus:** • General Structure of the Solar System • Clusters and Constellations • Light Years • Relative distances • Apparent and real motion	**Tests:** End of Unit Test **Practicals:** Astronomical and Astrophysical Simulations

			• Fusion in stars • Hydrostatic Equilibrium in stars • Luminosity and Brightness • Stefan-Boltzmann law • Wien's Law and the colour of stars • Stellar Spectra • Binary Stars • The HR diagram • Stellar Distances • Absolute and Apparent magnitudes • Spectroscopic Parallax • Cepheid Variables • Olber's Paradox • Big Bang model • The Future of the Universe **2. Essential knowledge**: **3. Key skills:** • Experimental Design • Data Collection & Processing • Writing Conclusions and Evaluations	