المدرسة الأمريكية الدولية
American International School

HIGH SCHOOL

International Baccalaureate®
Baccalauréat International
Bachillerato Internacional

SCIENCE SCOPE AND SEQUENCE
CONCEPTUAL PHYSICS & AIS PHYSICS
AY 26-27

STRAND	STANDARDS/SKILLS (Common Core)	9th	10th	11th/12th
1 - Introduction to Physics (A Physics Toolkit)	Use appropriate tools, SI units, dimensional analysis, significant figures, and graphical methods to make and communicate accurate measurements and analyze physical data.		*Students learn unit conversions using the stairs method. Students also learn how to write the numbers in standard form and scientific notation.*	A Physics Toolkit: mathematics and physics; measurement; SI units; scientific notation and significant figures; graphing and interpreting data.
2 - Motion in 1D and 2D	Analyze and interpret position-time representations to describe an object's position, distance, displacement, and motion over time.		*Students learn to use rise/run to calculate slope of DT graph and V-T graph, students also find area under graph*	Representing Motion: position, distance, displacement, time, motion diagrams, and position-time graphs.
	Calculate and interpret average and instantaneous speed and velocity, including using the slope of a position-time graph.		*Students distinguish between average and instantaneous velocity from the graphs.*	Representing Motion: average and instantaneous speed; average and instantaneous velocity; slope of position-time graphs.
	Analyze accelerated motion using velocity-time graphs and apply constant-acceleration relationships to solve quantitative problems.		*Use motion diagrams to represent motion-extract information from a v-t graphs*	Accelerated Motion: acceleration; velocity-time graphs; constant-acceleration relationships and problem solving.
	Apply constant-acceleration models to free-fall and vertical-motion situations, using gravitational acceleration appropriately.		*Distinguish between mass and weight, understand that all objects have the same acceleration due gravity.*	Accelerated Motion: free fall and gravitational acceleration; applying kinematic relationships to vertical motion.

	Resolve vectors into components and apply independent horizontal and vertical motion to analyze and solve projectile-motion problems.		*Use graphical and Pythagorean method to add vectors*	Motion in Two Dimensions: vectors and components; projectile motion; horizontal and vertical components of motion.
3 - Forces	Identify forces acting on an object, construct free-body diagrams, determine net force, and distinguish balanced from unbalanced forces.		*Distinguish between contact and non contact forces*	Forces in One Dimension: force as an interaction; free-body diagrams; net force; balanced and unbalanced forces.
	Apply Newton's first, second, and third laws to explain and predict motion, including relationships among force, mass, acceleration, and weight.		*Understand inertia as an objects resistance to motion*	Newton's Laws: inertia; Newton's first, second, and third laws; mass, weight, and applications of F = ma.
	Analyze forces in two dimensions using vector components, including friction, tension, normal force, equilibrium, and inclined-plane situations.		*Find the horizontal and the vertical components of 2d forces*	Forces in Two Dimensions: vector addition of forces; friction; tension; normal force; equilibrium and inclined planes.
	Apply gravitational and centripetal-force relationships to explain and solve problems involving gravitation and circular motion.		*Calculate centripetal force and understand the direction towards the center*	Gravitation and Circular Motion: universal gravitation; gravitational force; circular motion and centripetal force.
4 - Energy and Momentum	Calculate momentum and impulse and apply the impulse-momentum relationship to changes in an object's motion.		*Understand that impulse is the change in momentum, use force and time to calculate momentum*	Momentum and Its Conservation: momentum, impulse, and the impulse-momentum relationship.
	Apply conservation of momentum to interactions, including elastic and inelastic collisions and recoil situations.		*Use car accidents to apply the principle of conservation of momentum.*	Momentum and Its Conservation: conservation of momentum; elastic and inelastic collisions; recoil.
	Calculate work, kinetic energy, power, and mechanical advantage and apply the work-energy relationship to physical systems.		*Understand that the amount of work done is equal to the amount of energy transferred*	Energy, Work, and Simple Machines: work, kinetic energy, work-energy relationship, power, and mechanical advantage.
	Analyze transformations among kinetic, potential, and mechanical energy and apply conservation of energy to solve problems.		*Use real life situation such as roller coaster to understand energy changes*	Energy and Its Conservation: potential energy, kinetic energy, mechanical energy, conservation of

				energy, and energy transformations.
	Select and apply conservation of energy and conservation of momentum to solve multi-step problems and interpret physical representations.		*Understand that energy is neither created nor destroyed, it can be only converted*	Energy and Momentum Applications: solve multi-step problems using conservation laws and interpret energy/momentum representations.
5 - Electricity	Explain electric charge and charging processes and apply Coulomb's law to determine the magnitude and direction of electrostatic forces.		*Distinguish between static and dynamic electricity*	Static Electricity: electric charge; conductors and insulators; charging by contact and induction; Coulomb's law.
	Model and interpret electric fields, electric force, electric potential energy, and potential difference using diagrams and quantitative relationships.		*Draw electric field lines, understand they. Move out of the positive chargers and into the negative charges*	Electric Fields: electric field and field lines; electric force; electric potential energy and potential difference.
	Analyze electric circuits using current, resistance, voltage, Ohm's law, electrical power, and equivalent resistance in series and parallel circuits.		*Distinguish between series and parallel circuits, changes in current and voltage*	Current Electricity and Circuits: current, resistance, voltage, Ohm's law, electrical power; series and parallel circuit analysis.