Xilin Northwest Chinese School
AP Physics 1
Fall 2018 Course Introduction and Instructional Plan

Course Code	AP_PHY_A_1
Classroom Number	247
Course Meeting	• 15:00 - 16:50, Every Sunday from Aug 26th to Dec 16th, 2018; • 14 Course Meetings in total.
Instructor	Haoyu Wang, Ph.D.
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Course Description:

- Being more advanced than regular AP Physics 1 classes, this course will help the students of Grade 7+ understand and master the fundamental concepts of mechanics, as well as apply them to solve complicated problems in a flexible manner. We will focus on building the capability for the students to analyze and understand problem efficiently, and to solve the problem using the correct model gained in class.
- Not only is this course designed to fully prepare the students for a score of 5 in the AP Physics 1 exam, but also to build the foundation of F=ma exam (USA Physics Olympiad Level 1) for the students with a higher expectation in themselves.
- The course will be organized as lectures, demonstration experiments, and in-class problem-solving practices.

Prerequisite:

- Basic algebra knowledge (Quadratic equation, System of linear equations, Vectors)

Textbook and other material requirement:

- *Physics: Principles with Applications (5th Edition, 1997)* by Douglas C. Giancoli.
- Course-specific binder, Loose leaf papers, Scientific calculator, Pens & Highlighters.

Instructional Plan:

Class #01 • Introduction • Kinematics in One Dimension (Newton's first law; Equilibrium forces; Mathematical expression of motion; Offset, velocity and acceleration)
Class #02 • Kinematics in Two Dimensions (Vector calculation; Combination of independent motions on two axis, Relative Velocity)
Class #03 • Dynamics (Force, mass, Newton's second law and acceleration; Force Diagrams; Frictions and deceleration;)

Class #04 • Dynamics (Newton's third law; Propulsion and air drag) • Circular Motion (Uniform Circular Motion; Mathematical expression; Frequency, Period, linear and angular velocity; Centripetal force)
Class #05 • Circular Motion (Centrifugation; Newton's Law of universal gravitation; Gravity on planet surfaces; Man-made satellites and Weightlessness; Kepler's laws)
Class #06 • Work and Energy (Doing work by constant force/varying force; Kinetic energy and gravitational potential energy; Conservative Forces; Conservation law of Mechanical energy)
Class #07 • Work and Energy (Energy transformation; Power; Energy loss) • Linear Momentum (Momentum, velocity, force, time; Conservation of momentum; Impulse and change of momentum; Conservation of energy and momentum in collisions)
Class #08 • Linear Momentum (Elastic collisions in one dimension; Inelastic collisions; Higher dimensional collisions; Center of Mass; Translational motion)
Class #09 • Rotational Motion (Angular expression of motion; Angular acceleration; Rolling motion; Torque and rotational inertia; Comparison between linear and rotational motion)
Class #10 • Rotational Motion (Rotational kinetic energy; Angular momentum conservation; Vector expression of Angular quantities; Superposition of translational and rotational motion)
Class #11 • Fluids (Density; Pressure in fluids and atmosphere; Pascal's principle; Buoyancy and Archimedes' principle; Fluids Dynamics and Bernoulli's equation)
Class #12 • Vibrations and Waves (Simple harmonic motion; Energy of harmonic oscillator; Mathematical expression; Simple pendulum)
Class #13 • Vibrations and Waves (Damped harmonic motion; Forced Vibrations; Resonance; Wave motion and math expression; Energy associated with wave)
Class #14 • Sound (Longitudinal waves; Decibels; Source of sound; Doppler effect) • End-semester Review

Instructor Information

- Dr. Haoyu Wang earned his B.S. degree from University of Science and Technology of China in 2011 and his Ph.D. degree from Purdue University in 2017. He had more than 4 years of experience instructing undergraduate level physics courses including mechanics and electromagnetism, winning the Excellent Graduate Teacher Award of Purdue University in 2014. Currently he is working in a national laboratory in Chicago area, focusing on the research field of applied nuclear physics.