Effective Date: 2008-2009

Hamburg Area School District

Name of Course: AP Physics B
Department: Science

Grade Level: 11th and 12th
Instructional Time: 180 Days
Length of Course: Year
Period Per Cycle: Eight
Length of Period: 43 minutes

Texts and Resources:

1. Lou, Wilson Buffa. College Physics Sixth Edition. Pearson/Prentice Hall. 2007
2. Puri, Om P., Zober, Patricia J., Zober, G. Patrick. Physics Laboratory Manual. Pearson Custom Publishing. 2001
3. Internet Resources
4. Physlet® Physics: Interactive Illustrations, Explorations and Problems for Introductory Physics, 1/E
Christian & Belloni | ©2004 | Addison-Wesley | Paper; 352 pages

Assessments:

Text and/or teacher made test
Formal and Informal observation
Formal and Informal evaluation
Projects

Hamburg Area School District
Course Plan
(Science)

Course Name: AP Physics B
Unit: Newtonian Mechanics **Time Line: 11.25 cycles**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is Physics?	Identify activities and fields that involve the major areas within physics Describe the processes of the scientific method Describe the role of models and diagrams in physics	S11.A.1.2.1 S11.A.1.1.1
How are measurements interpolated in experiments?	List basic SI units and the quantities they describe Convert measurements by using dimensional analysis Use significant figures in measurements and problem solving Interpret data in tables and graphs, and develop equations Describe the safety procedures for lab Perform a lab on measurement and error analysis	S11.A.1.1.4 S11.A.1.3.1
What is motion in one dimension?	Construct and interpret graphs of position versus time Describe motion in terms of distance, displacement, and time Distinguish between speed and velocity Describe motion in terms of a rate Describe motion in terms of a rate of a rate Describe a motion of a freely falling body Calculate displacement, speed, velocity, and distance Demonstrate and perform a lab related to one dimension motion Perform a lab on the kinematics of accelerated motion	S11.A.3.3.3 S11.A.2.1.1 S11.A.2.1.2

Hamburg Area School District
Course Plan
(Science)

Course Name: AP Physics B
Unit: Newtonian Mechanics **Time Line: 11.25 cycles**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is two dimensional motion and vectors?	Distinguish between a vector quantity and a scalar quantity Solve vectors by graphical addition of vectors (polygon method) Solve vectors by the parallelogram method Solve vectors by the component method using trigonometric functions Describe the path of a projectile as a parabola Perform a lab on projectile motion Solve vectors into their components and apply the kinematics equations to solves problems involving projectile motion Solve problems involving relative velocity Analyze graphical motion by using a motion detector	S11.A.3.2.1 S11.A.3.3.3

Hamburg Area School District
Course Plan
(Science)

Course Name: AP Physics B
Unit: Newtonian Mechanics **Time Line:**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What are forces and the Laws of Motion?	Explain Newton's First Law Explain Newton's Second Law Solve Newton's Second Law by F=ma Explain Newton's Third Law Calculate the force required to bring to bring an object into equilibrium Solve Equilibrium problems Perform a lab on Free Fall Perform a lab on Newton's Second Law	S11.C.3.1.2 S11.C.3.1.3
What are work, energy, and power?	Calculate work using the Work-Energy Theorem Explain conservation of forces Calculate potential and kinetic energy using the Conservation of Mechanical Energy Calculate power Perform a lab on Static Equilibrium	S11.C.3.1.6 S11.C.3.1.5 S11.C.3.1.1
What is linear momentum?	Explain and calculate impulse and linear momentum Explain Conservation of Linear Momentum Solve linear momentum problems	S11.C.3.1.1
What is circular and rotational motion?	Explain uniform circular motion Explain angular momentum of point particles Calculate torque Calculate rotational equilibrium Solve rotational equilibrium problems Explain second condition for equilibrium Solve second condition equilibrium problems	S11.C.3.1.1 S11.C.3.1.2 S11.A.2.1.1 S11.A.2.1.2

Hamburg Area School District
Course Plan
(Science)

Course Name: AP Physics B
Unit: Newtonian Mechanics **Time Line:**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is oscillations and gravitation?	Explain simple harmonic motion Perform a lab on pendulum motion Explain Hooke's Law and a mass on a spring Perform a lab on Hooke's Law Explain pendulums Explain and Calculate Newton's Universal Law of Gravitation Solve simple harmonic problems Explain motion of planets and satellites in circular orbits Solve orbital problems	S11.A.2.1.1 S11.C.2.1.1 S11.A.1.1.4

Hamburg Area School District
Course Plan
(Science)

Course Name: AP Physics B
Unit: Fluid Mechanics and Thermal Physics **Time Line: 4 cycles**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is fluid mechanics?	Explain hydrostatic pressure Explain buoyancy Explain fluid flow continuity Calculate and define Bernoulli's equation Solve pressure and continuity problems	S11.A.2.1.1 S11.A.2.1.2
What is temperature and heat?	Explain mechanical equivalent of heat Explain and calculate specific heat Explain latent heat Explain and calculate thermal expansion Explain heat transfer Solve latent heat and specific heat problems Perform a Specific Heat lab	S11.A.2.1.1 S11.A.2.1.2
What is the kinetic theory of gases?	Explain the ideal gaseous behavior by the Kinetic Model and the Ideal Gas Law Calculate the Ideal Gas Law Solve Ideal Gas Law problems Explain and analyze the First Law of Thermodynamics by the isobaric and isovolumetric processes Analyze PV diagrams Explain and analyze the Second Law of Thermodynamics by using the heat engines and Carnot engines Analyze and solve entropy problems	S11.A.2.1.1 S11.C.1.1.5

Hamburg Area School District
Course Plan
(Science)

Course Name: AP Physics B
Unit: Electricity and Magnetism **Time Line: 8.75 cycles**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is electrostatics?	Explain and define Coulomb's Law Calculate Coulomb's Law Define, explain, and solve E-fields problems Define and explain electric potential	S11.C.2.1.4 S11.C.3.1.4
What are conductors, capacitors, and dielectrics?	Define and explain conductors, capacitors, and dielectrics Analyze, and solve parallel plate capacitors problems	S11.B.3.4.12 S11.C.3.4.12 S11.C.3.8.12
What are electrical circuits?	Define and explain current, resistance, and power Analyze and solve DC circuits with batteries and resistors problems Analyze capacitors in steady state circuits Perform an Ohm's Law lab Perform a series and parallel resistor circuit lab	S11.C.2.1.4
What is magnetostatics?	Analyze and solve forces on charged particles moving in a B-field Analyze and solve forces on current carrying wires in a B-field	S11.A.1.1.3

Hamburg Area School District
Course Plan
(Science)

Course Name: AP Physics B
Unit: Electricity and Magnetism **Time Line:**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is electromagnetism?	Describe and explain electromagnetic induction Analyze Faraday's Law of Induction Analyze Lentz's Law Solve magnetic flux and motional EMF problems	S11.B.3.4.12 S11.C.3.4.12 S11.C.3.8.12

Hamburg Area School District
Course Plan
(Science)

Course Name: AP Physics B
Unit: Waves and Optics **Time Line: 5.8 cycles**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is wave motion and sound?	Analyze properties of traveling waves Analyze properties of standing waves Perform standing wave lab Develop an understanding of Doppler Effect Analyze superposition of waves Solve longitudinal wave problems	S11.C.3.1.3 S11.A.2.1.1
What is physical optics?	Explain interference Explain diffraction Explain dispersion of light Analyze the electromagnetic spectrum Perform a Snell's Law lab	S11.A.2.1.1
What is geometric optics?	Explain reflection, refraction, mirrors, and lenses Solve Snell's Law problems Perform refraction and reflection lab	S11.A.2.1.1 S11.A.3.3.3

Hamburg Area School District
Course Plan
(Science)

Course Name: AP Physics B
Unit: Miscellaneous Projects **Time Line: 20 cycles**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
Do students have enough practical application of Physics and science? Students will have the opportunity to work on related sections of certain science and / or engineering projects but not limited to the Science Olympiad, TEAMS, Penn Technology Engineering Competition (PEM Fuel Cells), and the Reading Berks Science and Engineering Fair.	Apply logic and problem solving skills Ability to apply facts and formulas to real science and / or engineering questions Provides examples of the importance of science and engineering to everyday human life Apply knowledge learned in the classroom to real world science and engineering scenarios Inspire creativity, team-work, critical thinking, and peer-to-peer cooperation	S11.A.1.1.3 S11.A.2.1.1 S11.A.3.3.3 S.11.A.1.3.1