Course Outline
Physics

Physics Scope and Sequence				
Module/Topic	**Name**	**Number**	**2003 Standards of Learning**	**2010 Standards of Learning**
Developmental Module				
Module 1	Describing Motion			
Topic 1	Position, Distance, and Displacement	1.1	PH.5 TSW investigate and understand the interrelationships between distance and time through mathematical and experimental processes. Key concepts include: a) Linear Motion	PH.5
Topic 2	Speed and Velocity	1.2	PH.5 a)	PH.5 a.
Topic 3	Acceleration	1.3	PH.5 a)	PH.5 a.
Topic 4	Modeling Linear Motion with Equations	1.4	PH.5 a)	PH. 5 a.
Topic 5	Freefall	1.5	PH.5 a)	PH 5 a.
Module 1 Evaluation		ME1		
Module 2	Forces and Newton's Laws			
Topic 1	Forces and Their Representation	2.1	PH.5 TSW investigate and understand the interrelationships between mass, distance, force and time through mathematical and experimental processes. Key concepts include: d) Newton's Laws of Motion	PH.5
Topic 2	Newton's First Law and Balanced Forces	2.2	PH. 5 d)	PH.5 d.
Topic 3	Newton's Second Law and Unbalanced Forces	2.3	PH.5 d)	PH. 5 d.
Topic 4	Forces at an Angle and Vectors	2.4	PH.5 d) PH.2 e)	PH.5 d. PH.2 e.
Topic 5	Applications of Two Dimensional Forces	2.5	PH.5 d) PH.2 e)	PH.5 d. PH.2 e.
Module 2 Evaluation		ME2		
Module 3	Motion in Two Dimensions		PH.5 TSW investigate and understand the interrelationships among mass, distance, force, and time through mathematical and experimental processes. Key concepts include c) projectile motion	PH.5
Topic 1	Principles of Projectile Motion	3.1	PH.5 c)	PH.5c
Topic 2	Horizontal Projectiles	3.2	PH.5 c)	PH. 5 c.
Topic 3	Projectiles Launched at an Angle	3.3	PH.5 c)	PH. 5 c.
Topic 4	Uniform Circular Motion	3.4	PH.5 b) uniform circular motion;	PH. 5 b.
Topic 5	Universal Gravitation	3.5	PH.5 e) Gravitation PH.12 a) Gravitation and Coulomb's Law PH.5 f) Planetary Motion	PH. 5 e. PH. 5 f.
Module 3 Evaluation		ME3		
Module 4	Energy			
Topic 1	Work and Power	4.1	PH.6 a) PH.8 a) and b) PH.5 g)	PH. 5 g.
Topic 2	Energy	4.2	PH.6 a) Kinetic & Potential Energy PH.5 g)	PH.5 g. PH.12 c
Topic 3	Work-Kinetic Energy Theorem	4.3	PH.8 TSW investigate and understand that energy can be	PH.7

			transferred and transformed to provide usable work. Key concepts include: a) Transfer & storage of energy among systems including mechanical, thermal, gravitational, electromagnetic, chemical and nuclear systems.	
Topic 4	Conservation of Mechanical Energy	4.4	PH.6 TSW investigate and understand that energy is conserved. PH.8 b) Efficiency of systems	PH.6 PH.7 b.
Module 4 Evaluation		ME4		
Module 5	Impulse and Momentum		PH.6 TSW investigate and understand that momentum is conserved.	PH.6
Topic 1	Impulse and Momentum	5.1	PH.6	PH.6
Topic 2	Newton's Third Law	5.2	PH.6 PH.5 d)	PH.5 d. PH.6
Topic 3	Conservation of Momentum in Explosions	5.3	PH.6 TSW investigate and understand that momentum is conserved.	PH.6
Topic 4	Conservation of Momentum in Collisions	5.4	PH.6 b) Elastic & Inelastic Collisions	PH.6 b.
Module 5 Evaluation		ME5		
Module 6	Waves			
Topic 1	Wave Characteristics	6.1	PH.9 TSW investigate and understand wave phenomena. Key concepts include: a) Wave characteristics (period, frequency, amplitude, energy, phase)	PH.8 b.
Topic 2	Wave Interactions	6.2	PH.9 b) Fundamental wave processes (interference, resonance, diffraction, doppler shift, refraction, reflection)	PH.8 b.
Topic 3	Sound	6.3	PH.9 c) Sound in terms of wave models	PH.8 c.
Topic 4	Light Waves	6.4	PH.9 c) Light in terms of wave models.	PH.8 c.
Topic 5	The Electromagnetic Spectrum	6.5	PH.10 TSW investigate and understand that different frequencies and wavelengths in the electromagnetic spectrum are phenomena ranging from radio waves through visible light to gamma radiation. Key concepts include: PH.10 a) Properties, behaviors, and relative size of radio waves, microwaves, infrared, visible light and gamma rays. PH.10 b) current applications based on the wave properties of each band.	PH.9a. PH.9b.
Module 6 Evaluation		ME6		
Module 7	Electricity Current & Circuits		PH.6 investigate and understand that charge is conserved PH.13 a) Ohm's Law b) series, parallel & combo circuits c) circuit components including resistors, batteries, generators, fuses, switches and capacitors PH.12 a) Coulomb's Law b) operating principles motors,	PH.11

			generators, transformers and cathode ray tubes.	
Topic 1	Charge	7.1	PH.6	PH.6
Topic 2	Coulomb's Law: Electric Force, Field, and Potential	7.2	PH. 6 PH.13 c) PH. 12 a) and b)	PH.6 PH.10 a. PH.10 b. PH.11 c.
Topic 3	Current, Ohm's Law and Power	7.3	PH.13 a)	PH.11 a.
Topic 4	Simple Circuits	7.4	PH.13 b) and c)	PH.11 b. PH.11 c.
Topic 5	Combination Circuits	7.5	PH. 13 b) and c)	PH.11 b. PH.11 c.
Module 7 Evaluation		ME7		
Module 8	20th Century Physics		PH.14 a-h	PH.12 a-j.
Topic 1	Wave-Particle Duality	8.1	PH.10 TSW investigate and understand the wave/particle dual nature of light and current applications based on wavelength. PH.14 TSW investigate and understand that extremely small objects are not described by the same laws as those studied in Newtonian Physics. Key concepts include a) wave/particle duality; b) wave properties of matter; quantum mechanics and uncertainty.	PH.9 PH.12
Topic 2	Special Relativity	8.2	PH.14 e) relativity	PH.12 e.
Topic 3	Quantum Mechanics	8.3	PH.14 TSW investigate and understand that extremely small objects are not described by the same laws as those studied in Newtonian Physics. Key concepts include a) wave/particle duality; b) wave properties of matter; quantum mechanics and uncertainty.	PH.12
Topic 4	Radioactivity	8.4	PH.14 i) radioactivity PH.14 f) nuclear physics PH.14 c) matter/energy equiv.	PH.12 j. PH.12 f. PH.12 c.
Topic 5	Modern Physics	8.5	PH.14 g) solid state physics PH.14 h) superconductivity	PH.12 g. PH.12 i.
Module 8 Evaluation		ME8		
Module 9	Fluids		PH.7 TSW investigate and understand properties of fluids.	***Removed from the 2010 Standards of Learning***
Topic 1	Pressure	9.1	PH.7 a) density and pressure PH.7 b) variations of pressure with depth	
Topic 2	Pascal's Principle	9.3	PH.7 d) Pascal's principle	
Topic 3	Archimedes Principle and Buoyancy	9.2	PH.7 c) Archimedes' principle of buoyancy	
Topic 4	Bernoulli's Principle	9.4	PH.7 e) fluids in motion PH.7 f) Bernoulli's principle	
Module 9 Evaluation		ME9		
Module 10	Optics		PH.11 TSW investigate and understand , in describing optical systems how light behaves in the fundamental processes of reflection, refraction and image formation.	***Removed from the 2010 Standards of Learning***
Topic 1	The Law of Reflection	10.1	PH.11 a) laws of reflection and	

			refraction	
Topic 2	Curved Mirrors	10.2	PH.11 b) construction and interprestation of ray diagrams PH.11 d) predictions of type, size and position of real and virtual images.	
Topic 3	Refraction	10.3	PH.11 a) laws of reflection and refraction	
Topic 4	Spherical Lenses	10.4	PH.11 b) construction and interprestation of ray diagrams PH.11 d) predictions of type, size and position of real and virtual images.	
Topic 5	Lens and Mirror Equation	10.5	PH.11 c) development and use of mirror and lens equations	
Module 10 Evaluation		ME10		
Integrated throughout course:			PH.1 a.-h. experimental design and product design PH.2 a.-e. data analysis PH.3 a.-e. nature of science, scientific reasoning, logic PH.4 a) application examples from real world PH.4 b) explore roles and contributions of sci and tech	PH.1 a.-h. PH.2 a.-e. PH.3 a.-e. PH.4 a.-b.