

Southern Cayuga Central School District – Curriculum Map

Subject: **Regents/CCC Physics**

School Year: 2021-2022

Title or Topics w/ NYS Standards	Essential Questions & Vocabulary	Content Skills (Activities to cover Essential Questions)	Major Assessments (Tests, Project, etc.)	Time Frame
<p>Scientific Basics – Units, Dimensions, Measurements, and Error M1.1, M2.1, M3.1, S2.1-S2.4, S3.4</p>	<ol style="list-style-type: none"> 1. What is science and how has it influenced the world? 2. Why do significant figures and scientific notation matter? 3. Why do scientists address sources of error? 4. Why can it be said that mathematics is the universal scientific language? 5. How do mathematical equations help us understand the world around us? <p>Vocabulary- Science, Scientific Process, Scientific Theory, Qualitative and Quantitative Observations, Significant Figures, SI Units, Scientific Notation, Inverse and Direct Relationships, Independent and Dependent Variables, Axis, Accuracy and Precision,</p>	<ol style="list-style-type: none"> 1. What is Science? 2. Using Laboratory Tools 3. Significant Figures and Scientific Notation 4. Sources of Error 5. Using math to explain observations. Understanding symbols in Physics. 6. Visual Representation of Data 	<p>Lab: Measurements in the Laboratory and Limits of Tools Lab: Significant Figures, Scientific Notation, Sources of Error Lab: Explaining observed phenomena using mathematical approximations. Lab: Graphing Data Quizzes (2) Test</p>	<p>1-2 weeks</p>

Introduction to (Advanced) Mathematical Processes	<ol style="list-style-type: none"> 1. What mathematical skills are required to analyze complex systems in the natural world? 2. What are vectors and scalars? 3. What is Pythagorean Theorem and how can we use it? 4. What is trigonometry, sine, cosine, and tangent? <p>Scalar, Vector, Angles, Sine Cosine, Tangent, Hypotenuse, Adjacent, Opposite, Algebra,</p>	<ol style="list-style-type: none"> 1. Basic Algebra Skills (up to 4 variables, 2 equations) 2. Basic Scalars and Vectors (Vector addition) 3. Pythagorean Theorem and Basic Trig Functions (Sine, Cosine, Tangent) 4. Advanced Algebra Skills (Multi equation and multiple unknowns) 	<p>Lab: Vectors Quizzes Test</p>	<p>1-2 weeks</p>
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<p>Kinematics</p> <p>HS-PS2-1.</p>	<ol style="list-style-type: none"> 1. Using vectors and trig functions to describe values with magnitude and direction. – Why is it beneficial to use vectors when analyzing motion? 2. Developing/Understanding Mathematical Equations for Motion. – How do kinematic equations help us understand our environment? 3. Analyzing changing systems: velocity and acceleration. - 4. Changing an object's motion and forces 5. How does gravity affect the universe? 6. Why is the acceleration due to gravity constant for many objects on Earth's Surface? 7. Why are different directions analyzed separately when dealing with projectiles? <p>Vocabulary- Displacement, Velocity, Acceleration, Vector, Scalar, Speed, Mass, Force, Resultant, Component, Initial, Final, Projectile, Hangtime, Gravity, Free-Fall, Projectile, Dimensions</p>	<ol style="list-style-type: none"> 1. Vectors and Trig Functions, 2. Direction 3. Position, Displacement and Distance 4. Velocity 5. Acceleration 6. Acceleration and Forces 7. Projectile Motion 8. Gravity 	<p>Lab: 1D Motion Lab: Measuring Acceleration Lab: Measuring Gravity Quizzes Test</p>	<p>5-6 weeks</p>
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<p>Newton's Laws of Motion</p> <p>PS2-1. HS-PS2-3</p>	<ol style="list-style-type: none"> How do forces shape and change the world around us? How do we apply Newton's Laws to every type of system? <p>Vocabulary- Force, Equilibrium, Inertia, Momentum, Free-body diagrams, Net,</p>	<ol style="list-style-type: none"> Newton's Laws (In-Depth) Different Types of Forces Specific Forces: Friction, Gravity, Applied, Tension, EM Forces, Nuclear Forces (Weak and Strong) 	<p>Lab: Balancing Forces Lab: Inertia Lab Lab: Measuring Acceleration Part 2 Lab: Measuring Gravity Part 2 Lab: Friction and Normal Force Lab: Friction and Normal Quizzes Test</p>	<p>5-6 weeks</p>
<p>Intro to energy, Work, Power and Simple Machines</p> <p>HS-PS3-1. HS-PS3-2</p>	<ol style="list-style-type: none"> What is work and power? How do forces at angles affect work/power. What are the simple machines and evidence that they help humans using math/physics? What are the different forms of energy and how is energy converted between forms? How is energy conserved? What is thermal energy? <p>Vocab – Work, Power, Simple Machines, Ideal Machine, Mechanical Advantage, Kinetic Energy, Potential Energy, Stored Energy, Electrical Potential Energy, Thermal Energy, Sound, efficiency</p>	<ol style="list-style-type: none"> Looking at different systems and how energy is converted between different forms. Kinetic Energy Potential Energy (Gravitational, Elastic, Chemical, Electric) Heat Nuclear Energy Radiation Laws of Thermodynamics 	<p>Lab – Conservation of energy in pendulum Lab – Work and Potential energy Lab – Conservation of Energy on an incline Lab - Calorimetry Quizzes Test</p>	<p>4-6 weeks</p>

<p>Momentum and Conservation of Momentum</p> <p>HS-PS2-2 HS-PS2-3</p>	<ol style="list-style-type: none"> 1. What is momentum and what is a conserved quantity in physics? 2. What is an isolated system and how does momentum behave within an isolated system? <p>Vocab – Momentum, impulse, conservation, isolated system</p>	<ol style="list-style-type: none"> 1. Momentum and Conservation + calculating momentum Multi-object systems in 2 dimensions. 2. Impulse – Momentum theory 	<p>Lab – Completely Inelastic Collisions Lab – Elastic Collisions Lab – Inelastic Collisions Lab – “Explosions” Quizzes Test</p>	<p>2-4 weeks</p>
<p>Centripetal Acceleration, Uniform Circular Motion, Gravity and Orbits</p> <p>HS-PS2-4. HS-ESS1-4.</p>	<ol style="list-style-type: none"> 1. What keeps objects traveling in a circular path – despite inertia? 2. What is centripetal acceleration and centripetal force? How can we calculate them? 3. What is gravity and how does it shape the world around us? Calculating the force of gravity. <p>Vocab – Centripetal, uniform circular motion, at a distance, period, weight, mass</p>	<ol style="list-style-type: none"> 1. Inertia and acceleration 2. Uniform circular motion 3. Force of gravity calculations 4. Kepler’s Laws of Planetary motion. 	<p>Lab: Centripetal acceleration for different circular motions – approximated to uniform circular motion. Lab: Phet Orbits Lab Test: Centripetal acceleration, uniform circular motion, gravity and orbits</p>	<p>2-3 weeks</p>

<p>Waves and Energy Transfer, Sound, Light</p> <p>HS-PS3-1 HS-PS4-1</p>	<ol style="list-style-type: none"> 1. What are waves? How is energy transferred? 2. What is sound? 3. What is light? 4. Frequency, wavelength, speed of light 5. How does modern technology communicate? How is information transferred? <p>Vocab – Wave, energy, frequency, wavelength, sound, light, photon, amplitude, harmonic, peak, trough,</p>	<ol style="list-style-type: none"> 1. Analyzing how waves transfer energy. 2. Looking at how waves and matter interact. Harmonics 	<p>Lab: Calculating the speed of sound. Test: Waves, Sounds and Light</p>	<p>2-3 weeks</p>
<p>Reflection and Refraction, Mirrors and Lenses, Interference of Light</p> <p>HS-PS4-1 HS-PS4-3</p>	<ol style="list-style-type: none"> 1. How does light interact when it bounces and when it passes through? 2. How can we take advantage of the properties of light to make our lives easier? <p>Vocab - Mirror, Lenses, Reflection, refraction, angle of incident, polarization, vacuum, index of refraction,</p>	<ol style="list-style-type: none"> 1. How do waves interact with matter? 2. Lenses and Mirrors (real and imaginary images) 3. interference 	<p>Lab: Mirror Lab Lab: Lenses Lab Lab: Polarization of Light Quiz: Reflection and Refraction</p>	<p>2-3 weeks</p>

<p>Electricity and Magnetism, Static Electricity, Electric Fields</p> <p>HS-PS1-3 HS-PS2-4 HS-PS3-5 HS-PS3-6</p>	<ol style="list-style-type: none"> 1. Static Electricity 2. Electric Fields 3. Current Electricity and Circuits 4. Magnetic Fields 5. Electromagnetic induction, Electromagnetism <p>Electricity, Magnetism, Fields Induction, Conduction, Resistance, Current, Potential, Volts, Amperes, Ohms, Series, Parallel, circuit, switch, Electrostatic,</p>	<ol style="list-style-type: none"> 1. Electrical Force 2. Electrical Circuits 3. Series and Parallel Circuits + Diodes 	<p>Lab: Magnetic Field Lab Lab: EM waves Lab: Circuits Test: Static Charges + Fields</p>	<p>2-3 weeks</p>
<p>Modern Physics and The Quantum World</p> <p>HS-PS1-8</p>	<ol style="list-style-type: none"> 1. Standard Model 2. What is matter made of? 3. Weak and Strong Forces: Forces within the nucleus 4. Decay of Particles <p>Quark, Lepton, Hadron, Baryon, Meson, Standard Model, Weak Force, Strong Force, energy levels, quantized, photon,</p>	<ol style="list-style-type: none"> 1. Standard Model 2. Particle Accelerators utility 3. What holds the nucleus together and where do we get energy from mass. 	<p>Test: Standard Model and Nuclear Forces Lab: Building Molecules</p>	<p>1-2 weeks</p>