

# Physics

## Syllabus 2022-2023

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**Room:** Science 123

**Course Description:** In Physics, students will learn about the foundational concepts of classical physics and develop problem-solving skills. The course will focus on topics related to mechanics (motion), electromagnetism, and waves. Instruction includes live and video demonstrations, hands-on laboratory activities, student writing and problem based homework assignments. Throughout the course, students will organize verbal information and apply the appropriate principles from algebra, geometry and trigonometry in simple and multistep problems. Students will learn how the ideas that shape our understanding of the physical world evolve. And, as various topics are presented, their historical, cultural and philosophical importance, as related to physics, is discussed. Lab work plays an integral part in any science curriculum, so students regularly participate in laboratory exercises in Physics. Computer acquisition and analysis of data, both tabular and graphical, is part of the laboratory experience. Students will be required to perform an experiment and create a formal lab report based on results. Much of the work will be done in cooperative groups, allowing students to discuss and learn skills in a real world setting.

**Next Generation Science Standards (NGSS) Skills:**

- Asking questions and defining problems
- Developing and using models
- Planning and carrying out investigations
- Analysis and interpretation of data
- Using mathematics and computational thinking
- Constructing explanations and designing solutions
- Engaging in arguments based on evidence
- Obtaining, evaluating, and communicating information

**Unit Study Overview:**

Title	Main Science Content
<p><b>Unit 1: Introduction &amp; Math Concepts</b> August/September</p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>• What can you say and what can't you say with confidence?</li> <li>• How sure are you?</li> <li>• Is the degree of precision relevant to our lives? Where are the puzzles, anomalies and questionable ideas in current theory?</li> <li>• What are the critical findings that support or call into question key theory? (i.e. gravitational force, atomic structure)</li> </ul>	<p><b>Unit 1 Breakdown:</b></p> <ol style="list-style-type: none"> <li>Mathematics in Physics</li> <li>Measurements</li> <li>Graphing Data</li> </ol> <p><b>Assessments:</b> Part of one exam, one quiz, one notebook check, one lab</p>
Title	Main Science Content
<p><b>Unit 2: Kinematics</b> September/October</p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>• How are multiple representations used to describe an object's motion?</li> <li>• How do scalar measurements differ from vector measurements?</li> <li>• How are kinematic equations and graphs used to describe an object's motion in free-fall?</li> </ul>	<p><b>Unit 2 Breakdown:</b></p> <ol style="list-style-type: none"> <li>Representing Motion</li> <li>Accelerated Motion</li> <li>Vectors</li> </ol> <p><b>Assessments:</b> Part of one exam, one full exam, six quizzes, three labs, two notebook checks</p>
<p><b>Unit 3: Dynamics</b> October/December</p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>• What causes objects to move the way they do in nature?</li> <li>• What is force and how does it cause a change in motion?</li> <li>• How can Newton's laws be utilized to describe an objects' motion?</li> </ul>	<p><b>Unit 3 Breakdown:</b></p> <ol style="list-style-type: none"> <li>Forces In One Dimension</li> <li>Forces In Two Dimensions</li> </ol> <p><b>Assessments:</b> Two exams, five quizzes, three labs, two notebook checks</p>
<p><b>Unit 4: Circular, Planetary Motion &amp; Gravitation</b> January</p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>• What causes and object to travel in a circular path?</li> <li>• Under what circumstances would travel in a circular path not be possible?</li> <li>• How are gravity and weight related?</li> <li>• What determines the strength of the force of gravity between two objects?</li> </ul>	<p><b>Unit 4 Breakdown:</b></p> <ol style="list-style-type: none"> <li>Motion In Two Dimensions</li> <li>Gravitation</li> </ol> <p><b>Assessments:</b> One exam, two quizzes, one lab, one notebook check</p>
<p><b>Unit 5: Impulse and Linear Momentum</b> January/February</p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>• How do perfectly elastic collisions, inelastic collisions, and perfectly inelastic collisions differ as far as conservation of energy and momentum are concerned?</li> <li>• How can energy be transferred from one object to another?</li> </ul>	<p><b>Unit 5 Breakdown:</b></p> <ol style="list-style-type: none"> <li>Impulse and Momentum</li> <li>Conservation of Momentum</li> </ol> <p><b>Assessments:</b> Part of one exam, two quizzes, one lab, one notebook check</p>

<p><b>Unit 6: Work, Energy, &amp; Power</b> February</p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>• How do you know something has energy?</li> <li>• In what ways do we witness the effects of something having energy?</li> <li>• Is energy conserved and what are the forms that conserved energy can take?</li> </ul>	<p><b>Unit 6 Breakdown:</b></p> <ol style="list-style-type: none"> <li>Energy and Work</li> <li>The Many Forms of Energy</li> <li>Conservation of Energy</li> </ol> <p><b>Assessments:</b> Part of one exam, one quiz, one lab, one notebook check</p>
<p><b>Unit 7: Waves</b> February</p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>• How do waves/vibrations carry energy?</li> <li>• How do waves travel?</li> <li>• What happens when two or more waves interact?</li> </ul>	<p><b>Unit 7 Breakdown:</b></p> <ol style="list-style-type: none"> <li>Wave Properties</li> <li>Wave Behavior</li> </ol> <p><b>Assessments:</b> One exam, two quizzes, one lab, one notebook check</p>
<p><b>Title</b></p>	<p><b>Main Science Content</b></p>
<p><b>Unit 8: Electrostatics</b> March</p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>• What is static electricity?</li> <li>• Why are there two types of charges (positive and negative)?</li> <li>• How is electric charge distributed in atoms and molecules?</li> <li>• What is the difference in the way various materials handle moving charge?</li> </ul>	<p><b>Unit 8 Breakdown:</b></p> <ol style="list-style-type: none"> <li>Electric Charge &amp; Electric Force</li> <li>Electric Field</li> </ol> <p><b>Assessments:</b> One exam, four quizzes, one lab, one notebook check</p>
<p><b>Unit 9: Direct Current Electric Circuits</b> April/May</p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>• Why is electrical energy important?</li> <li>• What are the basic circuit types?</li> <li>• What are the properties of each basic electrical circuit?</li> <li>• How can voltage and current be measured in series circuits, parallel circuits, series-parallel circuits, and complex circuits?</li> </ul>	<p><b>Unit 9 Breakdown:</b></p> <ol style="list-style-type: none"> <li>Current Electricity</li> <li>Series and Parallel Circuits</li> <li>Application of Circuits</li> </ol> <p><b>Assessments:</b> One exam, two quizzes, one lab, one notebook check</p>
<p><b>Unit 10: Magnetic Forces and Fields</b> May</p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> <li>• How are moving electric charge and magnetism related?</li> <li>• How do the properties of magnetism and electricity differ?</li> </ul>	<p><b>Unit 10 Breakdown:</b></p> <ol style="list-style-type: none"> <li>Magnets: Permanent and Temporary</li> <li>Forces Caused by Magnetic Fields</li> </ol> <p><b>Assessments:</b> Two quizzes, one notebook check</p>