Physics (4550) Course Overview Curriculum Document

Course Description

Physics deals with matter and energy and their interactions. The course will emphasize hands-on laboratory discovery that illustrates the physical and mathematical (algebra and trigonometry) relationships between objects and their surroundings. Physics will provide opportunities to develop problem solving and critical thinking skills based on science practices. Units of study include kinematics, dynamics, conservation and electricity.

Credits	Prerequisites
1	Concurrent with 9260 Algebra 2
Board Approved	**Revised**
May 1997, May 2023	October 1998, June 2008, April 2023

Required Assessments

District-wide, standards-based common summative assessments

Textbooks/Resources

Zitzewitz, P. W., Haase, D. G., & Harper, K. A. et al. (2020). *Inspire Physics*. McGraw Hill Education.
ISBN: 978-0-02-135316-3

Course Essential Understandings	Course Relevance Questions
As a result of successfully completing this course, students will understand: ● The state of an object in motion can be described by its displacement, position, velocity, and acceleration. ● The interactions of an object with other objects or fields can be described by forces. ● Changes occur when systems interact and those changes are constrained by conservation laws. ● Electrical interactions can be described by laws governing the behavior of electric charges. ● Science Practices allow scientists to problem solve and conduct investigations.	How do matter and energy interact and relate to the world around us? How can data, observation, and mathematics be used to develop models that describe the current, past, and future behaviors of systems?

Unit Overviews

Unit Name	Unit Description	Unit Relevance Question	Instructional Standards	Assessed Standards
Unit 1: Kinematics	At the end of this unit, students will use what they have learned to use graphical and mathematical modeling to explain and predict patterns of motion in one and two dimensions. The following concepts will be explored: Displacement, Velocity , Acceleration, Free Fall, Tangential Speed, Tangential Acceleration, and Vectors.	How can we quantify the movement of objects? How can we model motion?	**Big Idea 3**: The interactions of an object with other objects can be described by forces. **Big Idea 4:** Interactions between systems can result in changes in those systems.	**Big Idea 3:** The interactions of an object with other objects can be described by forces. **Big Idea 4:** Interactions between systems can result in changes in those systems.
Unit 2: Dynamics	At the end of the unit, students will use what they have learned to to explain and predict how Newton's laws affect the motion of objects. The following concepts will be explored: Force Diagrams, Newton's 1st Law, Newton's 2nd Law, Newton's 3rd Law, and Centripetal Force.	How can forces cause so many types of motion?	**Big idea 1:** Objects and systems have properties such as mass and charge. Systems may have internal structure. **Big idea 2**: Fields existing in space can be used to explain interactions. **Big Idea 3:** The interactions of an object with other objects can be described by forces. **Big Idea 4:** Interactions between systems can result in changes in those systems.	**Big Idea 3**: The interactions of an object with other objects can be described by forces. **Big Idea 4:** Interactions between systems can result in changes in those systems.
Unit 3: Conservation	At the end of the unit, students will use what they have learned to explain and predict how changes in the system are governed by laws of conservation. The following concepts will be explored: Conservation of Energy, Elastic Potential Energy, Kinetic Energy, Gravitational Potential Energy, Work, Power, Conservation of Momentum, Momentum, Impulse, Impulse-Momentum Theorem, and Inelastic vs Elastic Collisions.	How are quantities conserved within a system? What role do the laws of conservation play in everyday interactions?	**Big Idea 3:** The interactions of an object with other objects can be described by forces. **Big Idea 4**: Interactions between systems can result in changes in those systems. **Big idea 5**: Changes that occur as a result of interactions are constrained by conservation laws.	**Big Idea 4:** Interactions between systems can result in changes in those systems. **Big idea 5:** Changes that occur as a result of interactions are constrained by conservation laws.
Unit 4: Electricity	At the end of the unit, students will use what they have learned to explain and predict how electric charges affect	What is electricity and what governs its behavior?	**Big idea 1:** Objects and systems have properties such as mass and charge.	**Big idea 1:** Objects and systems have properties such as mass and charge.

	electrical interactions. The following concepts will be explored: Electric Charge, Electric Potential, Electric Fields, Coulomb's Law (Electrostatic Force), Current, Voltage, Resistance, Energy, and Kirchhoff's Rules.	What role does electricity play in the technology we use everyday?	Systems may have internal structure. **Big idea 2:** Fields existing in space can be used to explain interactions. **Big Idea 3**: The interactions of an object with other objects can be described by forces. **Big idea 5:** Changes that occur as a result of interactions are constrained by conservation laws.	Systems may have internal structure. **Big idea 2**: Fields existing in space can be used to explain interactions. **Big idea 5**: Changes that occur as a result of interactions are constrained by conservation laws.