

PHYSICS
Cole County R-2 School District
Mike Hague, Instructor
Grades 11 and 12

Course Description: Physics is the study of the properties, changes and interactions of matter and energy. The study of physics is useful in preparations of both academic and technical areas of interest.

Rationale: The purpose of physics is to continue the exploration of the topics begun in physical science. Physics is a college-prep course, designed to help prepare students for university study. The course will also improve the students' problem-solving skills.

Objectives: The students will know and be able to:

- Define and calculate speed, velocity, distance and acceleration
- Use Newton's laws to diagram the forces acting on an object
- Calculate the resultant and equilibrant vectors using graphic methods and analytical methods of vector addition
- Describe and calculate projectile and periodic motion
- Use the law of universal gravitation to calculate the forces acting between masses
- Define and calculate momentum and impulse
- Give examples of work and energy, and explain how these terms are related to simple machines
- Describe how energy changes occurred including how the laws of thermodynamics affect energy changes
- Compare and contrast the four states of matter, and describe how matter changes state
- Describe the properties and characteristics of transverse and longitudinal waves
- Describe and diagram how light behaves at a boundary (reflection, refraction, diffraction, and interference)
- Calculate static electric charges and forces
- Diagram and interpret simple and complex electric circuits calculating voltage, current, resistance, power, and energy from the diagram
- Describe the relationship between electric and magnetic forces and fields
- Illustrate the history of the development of the atomic model
- Analyze the components and corollaries of the quantum theory
- Define and diagram examples of radioactive decay, nuclear fission, and nuclear fusion
- List examples of nuclear applications and describe the positive and negative aspects of these examples

Instructional Strategies or Activities:

- Class discussion and notes, solve practice problems, conduct experiments with moving objects
- Analyze force diagrams, conduct experiments with force table
- Review basic trigonometry, draw vectors on graph paper

Instructional Strategies or Activities (cont):

- Conduct experiments with pendulums and springs, conduct experiments with projectiles, plot projectile motion on a computer
- Conduct experiments with colliding objects
- Dram a Rube Goldberg machine using the simple machines
- Conduct experiment and graph results of the phase of changes of water
- Draw examples of various waves, discuss application of waves of the electromagnetic spectrum
- Diagram how light can behave as a boundary, experiment with laser light striking different medians, experiment with convex and concave mirrors and lenses
- Conduct demonstrations with Van de Graff generator
- Draw diagrams of simple and complex circuits, troubleshoot existing circuit diagrams, view video “Understanding Electricity”
- Conduct experiments with magnets and electromagnets
- Draw examples of radioactive decay, diagram examples of nuclear fission and fusion, watch video “Fat Man and Little Boy”
- Library and Internet research of nuclear applications, watch video “Race for the Super Bomb”

Assessments:

- Questions from chapters, word problems from chapters, study guides, homework problems, oral responses and chapter tests
- Power-point presentation to classmates of Rube Goldberg machine, scoring guide used for evaluation, peer critiques of presentations
- Construct ray diagrams for lenses and mirrors
- Construct a working circuit from a schematic diagram
- Oral presentations
- Research paper/power-point presentation on “Nuclear Age”, scoring guide used for evaluation, peer critiques of presentations