

Murrieta Valley Unified School District
High School Course Outline
April 2004

Department: Science

Course Title: Physics

Course Number: 3530

Grade Level: 11-12

Length of Course: Year

Prerequisite: Successful completion of Algebra II and Chemistry with a grade of "C" or better

UC/CSU (A-G) Requirement: D

I. Goals

The student will:

- A. Analyze the motion of an object in one and two dimensions in terms of, velocity, acceleration, and applied forces (*Physics Standard 1. a, b, c, d, e, f, g, h, i, j, k, l, m*)
- B. Understand the conservative properties of energy and momentum as particles of matter interact with one another (*Physics Standard 2. a, b, c, d, e, f, g*)
- C. Demonstrate an understanding of kinetic theory as it applies to matter, heat transfer, and the laws of thermodynamics (*Physics Standard 3. a, b, c, d, e*)
- D. Apply the properties of waves to matter and the electromagnetic spectrum (*Physics Standard 4. a, b, c, d, e, f*)
- E. Understand electric and magnetic properties and the relationship of electric current and magnetic fields in the process of electromagnetic induction (*Physics Standard 5. a, b, c, d, e, f, g, h, i*)
- F. Demonstrate knowledge of modern physics, including relativity, quantum effects, and nuclear physics (*Physics Standard 1. h,)*

- G. Use appropriate tools and technology to recognize and solve physical problems by experimental investigation, formal logic, and mathematical reasoning when appropriate (*Investigation and Experimentation: 1. a, b, c, d, e, f, g, h, i, j, k, l, m, n*)

II. Outline of Content for Major Areas of Study

Semester I

- A. Measurement and Uncertainty
1. Measurement – The metric system
 2. Precision and accuracy
 3. Significant digits
- B. Motion in one dimension
1. Describing motion
 2. Displacement, velocity, and acceleration
 3. Graphing motion
 4. Acceleration and falling bodies
- C. Vectors and forces
1. Graphical and analytical addition of vectors
 2. Newton's three laws
 3. Application of Newton's laws
 4. The force of friction
 5. Periodic motion
- D. Forces and motion in two dimensions
1. Forces in two dimensions
 2. Projectile motion
 3. Circular motion
 4. Kepler's Laws of planetary motion
 5. Gravitational force
 6. Applications of the Law of Universal Gravitation
- E. Momentum and energy
1. Momentum, impulse, and angular momentum
 2. Conservation of momentum
 3. Energy, work and power
 4. Kinetic and potential energy
 5. Conservation of energy
 6. Elastic and inelastic collisions

Semester II

- A. Thermal energy and matter
 - 1. Temperature, heat, and thermal energy
 - 2. The laws of thermodynamics
 - 3. Properties of fluids
 - 4. Properties of solids
- B. Electricity and electrical currents
 - 1. Static electricity and electrical charge
 - 2. Electric fields
 - 3. Electric currents, circuits, and Ohm's law
 - 4. Series and parallel circuits
- C. Electromagnetism
 - 1. Magnets and magnetism
 - 2. Magnetic forces and fields
 - 3. Electromagnetic induction and its applications
 - 4. Electromagnetism and electromagnetic waves
- D. Waves, sound, and light
 - 1. Properties of waves
 - 2. Reflection, refraction, and diffraction
 - 3. Properties of sound and the Doppler shift
 - 4. Properties of light
 - 5. Mirrors and lenses
 - 6. Interference
- E. Relativity and quantum mechanics
 - 1. Special relativity
 - 2. General relativity
 - 3. Dual wave - particle nature

III. Accountability Determinants

- A. Daily work assessments
- B. Performance on laboratory component of the course by evaluation of formal lab write-ups
- C. Individual performance on exams and quizzes
- D. Evaluation of group and individual projects

IV. Required Text(s)

Zitzewitz, Paul W. *Physics, Principles and Problems*, New York, New York: Glencoe/McGraw-Hill, 1999.

V. Supplementary Materials

A scientific calculator is required for this course