Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Course: Physics I

This course is designed to present topics in mechanics, heat, electricity, magnetism, waves and optics. It will be taught using a concept based approach while simultaneously integrating the student's mathematical background in order to develop a meaningful Physics foundation. The program will be enhanced by experiences with an interactive computer based laboratory environment where students will gain hands on experience with the concepts being studied.

Level: S | Periods per week: 4 | Elective: 9-10
Prerequisite: None | Credit: 1

I. Learning Objectives:

By the completion of this course the successful student will have learned:

a. To conduct laboratory investigations in order to collect and analyze data and observations relating to the motion of matter, the forces acting on matter, and the behavior of electromagnetic and mechanical waves.
b. To design experimental procedures which test a hypothesis.
c. To apply the laws and principles of physics to observable events and processes.
d. To apply the laws and principles of physics to the development of technology.

II. Learning Experiences:

In this course students will:

a. participate constructively in class discussions
b. work cooperatively during laboratory investigations
c. accurately and effectively report the results of laboratory investigations
d. utilize class notes, homework assignments, and reading notes in preparation for exams

III. Course Outline: (A brief outline of the major topics and units which are central to this course; the sequence of topics and units may be altered by the teacher based on the needs of the students)

Mechanics	**Thermodynamics**	**Electricity and Magnetism**	**Wave Phenomenon**
Linear Motion	Temperature, Heat	Static Electricity	Sound
Newton's Laws of Motion	Expansion	Electric Current	Light & Optics
Circular Motion	Change of Phase	Magnetism	Reflection and Refraction
Gravitation	Heat Transfer	Electromagnetism	Diffraction and Interference
Momentum			
Energy Conversions			

IV. Course Materials: The following represents the major text and/or resources used in Physics I. Teachers also use supplementary texts, materials, computer simulations, and documents that they have gathered or prepared themselves to enrich and extend student learning.

1. Conceptual Physics, Addison - Wesley Publishing Co., 1997
2. Laboratory curriculum developed by the Center for Science & Math Teaching, Tufts University
3. Lab Investigations and Concept Development Workbook of the Conceptual Physics program

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Course Syllabus

Course: Physics I Honor

This course offers the same program as Physics 1 only in a more accelerated manner, and in more depth. It is designed for the student desiring a stronger Physics background and preparing to take subsequent Physics courses in the 12th grade. This course is designed to present topics in mechanics, heat, electricity, magnetism, waves and optics. It will be taught using a concept based approach while simultaneously integrating the student's mathematical background in order to develop a meaningful Physics foundation. The program will be enhanced by experiences with an interactive computer based laboratory environment where students will gain hands on experience with the concepts being studied.

Level: H Periods per week: 4 Elective: 9-10
Prerequisite: None Credit: 1
(It is recommended that Geometry H or Geometry/Algebra II Advanced be taken concurrently)

I. Learning Objectives:

By the completion of this course the successful student will have learned:

a. To conduct laboratory investigations in order to collect and analyze data and observations relating to the motion of matter, the forces acting on matter, and the behavior of electromagnetic and mechanical waves.
b. To design experimental procedures which test a hypothesis.
c. To apply the laws and principles of physics to observable events and processes .
d. To apply the laws and principles of physics to the development of technology.

II. Learning Experiences:

In this course students will:

a. participate constructively in class discussions
b. work cooperatively during laboratory investigations
c. accurately and effectively report the results of laboratory investigations
d. utilize class notes, homework assignments, and reading notes in preparation for exams

III. Course Outline: (A brief outline of the major topics and units which are central to this course; the sequence of topics and units may be altered by the teacher based on the needs of the students)

Mechanics	**Thermodynamics**	**Electricity and Magnetism**	**Wave Phenomenon**
Linear Motion	Temperature, Heat	Static Electricity	Sound
Newton's Laws of Motion	Expansion	Electric Current	Light & Optics
Circular Motion	Change of Phase	Magnetism	Reflection and Refraction
Gravitation	Heat Transfer	Electromagnetism	Diffraction and Interference
Momentum			
Energy Conversions			

IV. Course Materials: The following represents the major text and/or resources used in Physics I. Teachers also use supplementary texts, materials, computer simulations, and documents that they have gathered or prepared themselves to enrich and extend student learning.

1. Conceptual Physics, Addison - Wesley Publishing Co., 1997
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Course Syllabus

Course: Advanced Placement Physics C

The Physics C course forms the first two semesters of the college sequence that serves as the foundation in physics for students majoring in the physical sciences or engineering. The first half of the year is devoted to classical mechanics. In the second half of the year, the primary emphasis is on classical electricity and magnetism. Methods of calculus are used wherever appropriate in formulating physical principles and in applying them to physical problems. Use of calculus in problem solving and derivations is expected to increase as the course progresses. Students must have already completed a course in calculus or take it concurrently. Most colleges require science and engineering majors to take an introductory physics sequence of which this course covers two semesters. One part of the Physics C examination covers Newtonian mechanics. The other part covers electricity and magnetism. Separate grades are reported for the two subject areas.

Level: AP Periods per week: 6 Elective: 12
Prerequisites: Physics I H w/strong performance, Chemistry I, and Biology I Credit: 1
(It is recommended that Calculus AB or BC be taken concurrently)

I. Learning Objectives: By the completion of this course, the successful student will have learned:

a. To recognize, understand, and apply the basic concepts and laws of physics to the solving of problems
b. To recognize, understand, and apply the basic concepts of differential and integral calculus within the context of physics
c. To analyze and solve conceptual questions and problems
d. To develop lab procedures, collect data, and analyze results
e. To successfully take the national AP physics exams (Mechanics, Electricity and Magnetism).

II. Learning Experiences: In this course, students will:

a. listen to lectures, take notes, and actively participate in the class discussions
b. work together in lab groups and in problem-solving groups
c. learn how to use a variety of lab equipment
d. do laboratory experiments, analyze data and sources of error, and compare class results
e. solve many, many problems
f. analyze the results of calculations for "reasonableness" by considering extreme or limiting cases.

III. Course Outline:

Semester I. Newtonian Mechanics

I. Kinematics: vectors, vector algebra, components of vectors, coordinate systems, displacement, velocity, and acceleration
   A. Motion in one dimension
   B. Motion in two dimensions
      1. Projectile motion
      2. Circular motion
      3. Relative velocity
II. Newton's laws of motion
   A. Static equilibrium
   B. Dynamics of a single particle
   C. Systems of two or more bodies
III. Work, energy, power
   A. Work energy theorem
   B. Conservative forces
   C. Conservation of energy
   D. Power

IV. Linear momentum
    A. Center of mass
    B. Impulse and momentum
    C. Collisions and conservation of momentum
V. Circular motion and rotation
    A. Uniform circular motion
    B. Angular momentum and its conservation
        1. Point particles
        2. Extended bodies, including rotational inertia
    C. Torque and rotational statics
    D. Rotational kinematics and dynamics
VI. Oscillations and gravitation
    A. Simple harmonic motion
    B. Mass on a spring
    C. Pendulum and other oscillations
    D. Newton's law of universal gravitation
    E. Orbits of planets and satellites

Semester II. Electricity and Magnetism

I. Electrostatics
    A. Charge, field, and potential
    B. Coulomb's law; field and potential due to a point change
    C. Fields and potentials of other charge distributions
        1. Planar
        2. Spherical symmetry
        3. Cylindrical symmetry
    D. Gauss' law
II. Conductors, capacitors dielectrics
    A. Electrostatics with conductors
    B. Capacitors
        1. Parallel plate
        2. Spherical and cylindrical
    C. Dielectrics
III. Electric circuits
    A. Current, resistance, voltage, power
    B. Steady-state DC circuits with batteries and resistors only
    C. Capacitors in circuits
IV. Magnetostatics
    A. Permanent magnets
    B. Forces on moving charges
    C. Forces on current-carrying wires
    D. Magnetic fields of long current-carrying wires
    E. Biot-Savart and Ampere's laws
V. Electromagnetism
    A. Induction
    B. Inductance; RL, LC, and RLC circuits
    C. Maxwell's equations

IV Course Materials:

The text book for this course is University Physics 11th edition by Young and Freeman. Supplementary materials include Interactive Physics software, physics videos, and online computer simulations