Board Approved
September 2010

Wilson Area School District
Planned Course Guide

Title of planned course: AP Physics C – Independent Study

Subject Area: Science

Grade Level: 12

Course Description: AP Physics is our advanced placement course focusing on the concepts of electricity and magnetism. This course uses an independent study format requiring students to be motivated and problem solvers. Students taking this course will culminate their studies by taking the AP Physics C exam.

Time/Credit for this Course: 1 Academic Year / 1.4 Credits

Curriculum Writing Committee: Ed Insel and David Wright

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Wilson Area School District
Planned Course Materials

Course Title: AP Physics C

Textbook: Physics – Cutnell
Wiley
2001

Supplemental Books:

Teacher Resources:

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Curriculum Map

August: Electric Field

September: Electric Field
Gauss's Law

October: Electric Potential
Capacitance

November: Capacitance
DC Circuits

December: DC Circuits
Magnetostatics

January: Magnetostatics
Magnetic Induction

February: Magnetic Induction
Inductance

March: Inductance
Maxwell's Equation

April: Waves and Optics

May: AP Exam
Atomic & Nuclear Physics

June: Atomic & Nuclear Physics

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Curriculum Scope & Sequence

Planned Course: AP Physics C

Unit: Electric Field

Time frame: 2 weeks

Keystone State Standards: 3.2.P.B2, 3.2.P.B4, 3.2.P.B7

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to understand:

- Charge and Coulomb's Law
- Electric Field
- Point charge distributions
- Continuous charge distributions
- Motion of charged particles in an electric field

Core Activities: Students will complete/participate in the following:

- Reading textbook
- Problems sets
- Assigned lab experiments that may include:
  - Electroscope lab
  - Simulation labs
  - Mapping electric fields
  - One on one question session with teacher

Extensions:

Remediation:

Instructional Methods: Independent Study

Materials & Resources:

Assessments:

- In-class Q&A
- Self assessments
- Lab reports
- Problem sets

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Curriculum Scope & Sequence

Planned Course: AP Physics C

Unit: Gauss's Law

Time frame: 3 weeks

Keystone State Standards: 3.2.P.B2, 3.2.P.B4, 3.2.P.B7

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to understand:

- Electric flux
- Gauss's Law (general)
- Gauss's Law and various continuous charge distributions

Core Activities: Students will complete/participate in the following:

- Reading textbook
- Problems sets
- Assigned electric fields lab experiment

Extensions:

Remediation:

Instructional Methods: Independent Study

Materials & Resources:

Assessments:

- In-class Q&A
- Self assessments
- Lab reports
- Problem sets

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Curriculum Scope & Sequence

Planned Course: AP Physics C

Unit: Electric Potential

Time frame: 3 weeks

Keystone State Standards: 3.2.P.B2, 3.2.p.B4, 3.2.P.B7

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to understand:

- Electric potential and potential difference
- Potential differences in uniform electric fields
- Potential and point charges
- Potential and continuous charge distributions

Core Activities: Students will complete/participate in the following:

- Reading textbook
- Problems sets
- Assigned lab experiments that may include:
  - Electric power and batteries
  - Computer simulation of potential surfaces

Extensions:

Remediation:

Instructional Methods: Independent Study

Materials & Resources:

Assessments:

- In-class Q&A
- Self assessments
- Lab reports
- Problem sets

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Curriculum Scope & Sequence

Planned Course: AP Physics C

Unit: Capacitance

Time frame: 2 weeks

Keystone State Standards: 3.2.P.B2, 3.2.P.B4, 3.2.P.B7

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to understand:

- Capacitance
- Gauss's Law and capacitance
- Combination of capacitors
- Energy stored in capacitors
- Dielectrics

Core Activities: Students will complete/participate in the following:

- Reading textbook
- Problems sets
  - Assigned capacitor lab experiment

Extensions:

Remediation:

Instructional Methods: Independent Study

Materials & Resources:

Assessments:

- In-class Q&A
- Self assessments
- Lab reports
- Problem sets

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Curriculum Scope & Sequence

Planned Course: AP Physics C

Unit: DC Circuits

Time frame: 4 weeks

Keystone State Standards: 3.2.P.B2, 3.2.P.B4, 3.2.P.B7

Anchor(s) or adopted anchor: S11.C.2.1, S11.C.2.2

Essential content/objectives: At end of the unit, students will be able to understand:

- Ohm's Law
- Resistivity
- Electrical power
- Electromotive force and internal resistance
- Equivalent resistance
- Kirchhoff's rules
- RC circuits

Core Activities: Students will complete/participate in the following:

- Reading textbook
- Problems sets
- Assigned lab experiments that may include:
    - Ohm's law
    - Resistivity
    - Multi-loop circuit
    - RC time constant

Extensions:

Remediation:

Instructional Methods: Independent Study

Materials & Resources:

Assessments:

- In-class Q&A
- Self assessments
- Lab reports
- Problem sets

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Curriculum Scope & Sequence

Planned Course: AP Physics C

Unit: Magnetostatics

Time frame: 4 weeks

Keystone State Standards: 3.2.P.B2, 3.2.P.B4, 3.2.P.B7

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to understand:

- Magnetic force on moving charges and currents
- Path of moving charge in a magnetic field
- Hall effect
- Biot-Savart law
- Parallel conductors
- Ampere's law
- Solenoids and toroids

Core Activities: Students will complete/participate in the following:

- Reading textbook
- Problems sets
- Assigned lab experiments that may include:
    - Magnetic force
    - Hall effect
    - Solenoid
    - Ampere's Law

Extensions:

Remediation:

Instructional Methods: Independent Study

Materials & Resources:

Assessments:

- In-class Q&A
- Self assessments
- Lab reports
- Problem sets

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Curriculum Scope & Sequence

Planned Course: AP Physics C

Unit: Magnetic Induction

Time frame: 4 weeks

Keystone State Standards: 3.2.P.B2, 3.2.P.B4, 3.2.P.B7

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to understand:

- Magnetic flux,
- Gauss's law of magnetism
- Faraday's law of induction
- Lenz's law
- Induced *emf* and electric fields
- Generators and motors
- Maxwell's equations

Core Activities: Students will complete/participate in the following:

- Reading textbook
- Problems sets
- Assigned lab experiments that may include:
    - Faraday's law of induction
    - Motor / generator dissection
    - Magnetic field due to a slinky lab

Extensions:

Remediation:

Instructional Methods: Independent Study

Materials & Resources:

Assessments:

- In-class Q&A
- Self assessments
- Lab reports
- Problem sets

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Curriculum Scope & Sequence

Planned Course: AP Physics C

Unit: Waves and Optics

Time frame: 2 - 3 weeks

Keystone State Standards: 3.2.P.B5, 3.2.P.B7

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to understand:

- Wave motion (including sound) in regards to:
  - Traveling waves
  - Wave propagation
  - Standing waves
  - Superposition
- Physical optics in relation to:
  - Interference and diffraction
  - Dispersion of light and the electromagnetic spectrum
- Geometric optics in:
  - Reflection and refraction
  - Mirrors
  - Lenses

Core Activities: Students will complete/participate in the following:

- Reading textbook
- Problems sets
- Assigned lab experiments that may include:
  - Wave motion
  - Optics

Extensions:

Remediation:

Instructional Methods: Independent Study

Materials & Resources:

Assessments:

- In-class Q&A
- Self assessments
- Lab reports
- Problem sets

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Curriculum Scope & Sequence

Planned Course: AP Physics C

Unit: Atomic and Nuclear Physics

Time frame: 2 - 3 weeks

Keystone State Standards: 3.2.P.B4, 3.2.P.B5, 3.2.P.B6, 3.2.P.B7, 3.2.C.A3

Anchor(s) or adopted anchor:

Essential content/objectives: At end of the unit, students will be able to understand:

- Atomic physics and quantum effects such as:
  - Photons, the photoelectric effect, Compton scattering, x-rays
  - Atomic energy levels
  - Wave-particle duality
- Nuclear physics in regards to::
  - Nuclear reactions (including conservation of mass number and charge)
  - Mass-energy equivalence

Core Activities: Students will complete/participate in the following:

- Reading textbook
- Problems sets

Extensions:

Remediation:

Instructional Methods: Independent Study

Materials & Resources:

Assessments:

- In-class Q&A
- Self assessments
- Lab reports
- Problem sets