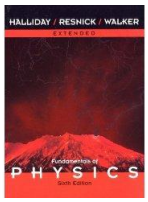
Course Requirements and Syllabus AP Exam Date: Monday, May 14th, 2012 2:00P Session

Course Description – AP Physics C: Electricity & Magnetism

The AP Physics C course is a challenging class that closely follows the syllabus designed by the College Board which prepares students to take the AP Physics C: Electricity and Magnetism exam. As the course utilizes differential and integral calculus where appropriate throughout, about half of the students in take Calculus concurrently (most in AB Calculus), the other half have taken Calculus in junior year (most are in BC Calculus). This course is intensive and requires the students' dedication and focus both in and out of class.

Textbooks:

ISBN#:	Publisher:	Author(s)	Date
0471332364	John Wiley & Sons	Halladay & Resnick	2001
0130611433	Prentice Hall	Giancoli	



Schedule
The class meets five days during a 2-week AB cycle for 84 minutes for both Fall (Mechanics) and Spring (E&M) semesters. This schedule provides a measure of flexibility to perform experiments or have extended problem solving sessions. In a typical week, 55-80 minutes will be dedicated to lab activities with the rest of the time devoted to class discussion, problem solving strategies and practice with solving problems, and assessment.

Grading:

Student grades will be based on specific learning expectations for each unit. Student work and contributions will be assessed using both formative (non-graded) and summative feedback (graded). The course grade will be based on the summative feedback only and may include unit assessments, lab assessments, and research projects.

Course Outline: The course will cover the following topics. Approximate length of time that will be allotted to the topics is given in parenthesis. Short summative assessment will be given during a 5 class session cycle. Approximately, 4 comprehensive summative assessments will be administered throughout the semester in addition to an end of semester examination.

- Electric Charge (1 week)
  - Coulomb's Law
  - Conductors and Insulators
  - Conservation of Charge

- Electric Field (E) (2 weeks)
  - Due to a Point Charge
  - Due to Charge Distribution
  - Discrete
  - Continuous
  - Electric Field Lines
  - Electric Dipole

- Electric Potential Energy and Electric Potential (2 weeks)
  - Electric Potential Energy

    - Two-Point System
    - Many-Particle System
    - Electric Potential
    - PE and V of a Point Charge
    - PE and V of a Charge Distribution
    - Relationship Between V and E
    - Electrical Properties of a Charged Conductor

- Gauss' Law (1 week)
    - Area Vector
    - Electric Flux
    - Gauss' Law Applications

- Capacitance (1 week)
    - Capacitor
    - Parallel Plate Capacitor
    - Cylindrical Capacitor
    - Spherical Capacitor
    - Energy Stored in Capacitor
    - Energy Stored in Electric Field
    - Capacitors with Dielectric

- DC Circuits (2 weeks)
    - Electric Current
    - Kirchoff's Junction Rule/Loop Rule
    - Resistors in Series and Parallel
    - Capacitors in Series and Parallel
    - Ohm's Law/Joule's Law
    - Energy in Circuits
    - RC Circuits (Steady State and Transients)

- Magnetic Fields (1 week)
    - Magnetic Interactions
    - Magnetic Poles or Lack Thereof
    - Force on a Moving Charge in a Magnetic Field
    - Circulating Charge
    - Force on Electric Current in a Magnetic Field
    - Electric Motor

- Magnetic Field due to Electric Current (1 week)
    - Long Straight Wire
    - Circular Loop
    - Solenoid
    - Parallel Wires
    - Biot-Savart Law and Applications
    - Ampere's Law and Applications

- Faraday's Law of Induction (1 week)
    - Electromagnetic Induction
    - Lenz's Law Applications

    - Electric Generator
    - Transformer

- Inductance (2 weeks)
    - Self-inductance
    - LR-Circuits
    - Energy Stored in a Magnetic Field
    - LC-Circuit and Electromagnetic Oscillations

- Maxwell's Equations (1 week)
    - The Basic Equations of Electromagnetism
    - Displacement Current and Ampere's Law
    - Maxwell's Equations

Possible Lab Experiments: Labs are chosen to enhance the students' learning and reinforce concepts that need it. Therefore, experiments will be designed with attention to this. Possible experiments that students may perform include the following:

Electrostatic charge on scotch tape (approx 45 minutes)
Variable Capacitor (Capacitance, Charge, and Voltage) (approx 75 minutes)
Mapping the electric potential of plates and points (approx 60 minutes)
Voltage/Current in circuits (Kirchoff's rules) (approx 90 minutes)
Deriving Ohm's Law (approx 60 minutes)
Mystery circuit (approx 45 minutes)
Internal resistance of battery (approx 60 minutes)
RC Circuits (approx 90 minutes)
Measure unknown capacitance/resistance in circuit (approx 60 minutes)
Measurement of EMF in coil (approx 60 minutes)
Resistivity of nichrome wire (approx 30 minutes)
Magnetic Field around current carrying wire (approx 75 minutes)
Magnetic Force on current carrying wire (approx 75 minutes)
RLC Circuits (approx 90 minutes)
Induction - Magnet through Coil (approx 60 minutes)