# KAP Physics 2009-10

Syllabus Dublin Jerome High School Mr. Falquet

### Course Overview

The Advanced Placement Physics C course prepares students for both parts of the AP Physics C examinations (Mechanics, Electricity/Magnetism). It provides students with advanced problem solving skills with the calculus that can be utilized in many fields of study. A block schedule allows students to learn from group activity over two 50-minute periods per day. A total of 18 required labs are completed (approximately two days per week are designated labs). A lab notebook, detailed chapter outlines, and peer reviewed presentations all serve to complete the student course portfolio. Students initially develop a conceptual approach to problem solving and a "process" rather than "product" approach to lab inquiry. The course enhances the development of questioning attitudes and creative thought processes within the students. Students gain a greater appreciation for physics, mathematics and other sciences.

#### Textbooks

Fundamentals of Physics 7<sup>th</sup> ed. by Halliday, Resnick and Walker Student Solutions Manual A Student's Companion

Secondary resources

ap advantage Physics C by Dr. James Mooney Little Books of Big Ideas Physics Gauss's Law with Applications to AP\* Physics C by Marion Appelquist Calculus for AP\* Physics C and Beyond by Dr. James Mooney

## Course Outline

#### I. NEWTONIAN MECHANICS

Topics: motion in one dimension, motion in two dimensions, projectile motion

Suggested Labs: PVA Measurement Lab, Projectile Motion Lab

Unit II: Newton's Laws of Motion

Chapter 5, 6 2-3 weeks

2-4 weeks

Chapters 2-4

Topics: static equilibrium, single particle dynamics, systems of two or more bodies Suggested Labs: Atwood, Mass and Pulley

| Unit III: Work, Energy and Power   | Chapter 7, 8           | 1-2 weeks             |  |  |
|--|------------------------|-----------------------|--|--|
| Topics: work, work-energy theorem, conservative forces and potential energy, conservation of energy, power   |                        |                       |  |  |
| Suggested Lab: Spring-loaded Cart Lab  |                        |                       |  |  |
| Unit IV: Systems of Particles-Linear Momentum  | Chapter 9              | 1-2 weeks             |  |  |
| Topics: impulse, momentum, conservation mass   | of linear momentum, c  | collisions, center of |  |  |
| Suggested Lab: Cart Collisions   |                        |                       |  |  |
| Unit V: Circular Motion and Rotation   | Chapter 10, 11         | 2-3 weeks             |  |  |
| Topics: uniform circular motion, angular m statics, and dynamics   | nomentum, torque, rota | tional kinematics,    |  |  |
| Suggested Labs: Centripetal Acceleration, Lab  | Rotational Equilibrium | , Rotational Inertia  |  |  |
| Unit VI: Oscillations  | Chapter 15             | 1 week                |  |  |
| Topics: simple harmonic motion (SHM) spring and mass motion, pendulum motion, relationship to uniform circular motion, relationship to conservation of energy, derivation from differential equation |                        |                       |  |  |
| Suggested Lab: Interactive Physics SHM Simulation  |                        |                       |  |  |
| Unit VII: Gravitation  | Chapter 13             | 1 week                |  |  |
| Topics: Newton's Law of Gravity, Gravitational Potential Energy, Kepler's laws,  |                        |                       |  |  |
| Suggested Lab: computer simulation of planetary motion   |                        |                       |  |  |

## II. ELECTRICITY AND MAGNETISM

| Unit X:     | Electrostatics  | Chapter 21, 23  | 2-3 weeks |  |  |
|-------------|---|-----------------|-----------|--|--|
| T<br>F<br>F | Topics: charge, field, potential, Coulomb's law, point charges, point-charge field an potential, electric fields of a variety of charge distributions (rings, disks, spheres, parallel plates, cylindrical shells), Gauss's law with applications |                 |           |  |  |
|             | Suggested Lab: Scotch Tape Lab  |                 |           |  |  |
| Unit XI:    | Conductors and Capacitors   | Chapter 24, 25  | 2-3 weeks |  |  |
| []<br>(     | Topics: electrostatics with conductors, capacitors, dielectrics, use of calculus and Gauss's Law to derive expressions related to electric fields   |                 |           |  |  |
|             | Suggested Lab: Capacitor Discharge Lab  |                 |           |  |  |
| Unit XI     | : Electric Circuits   | Chapters 26, 27 | 2-3 weeks |  |  |
| [           | Topics: current, resistance, power, ac, versus dc circuits, Kirchhoff's Rules, capacitors in circuits, RC Time Constant 1 and 2   |                 |           |  |  |
|             | Suggested Labs: Ohm's Law, Series and Parallel Circuits, Capacitors in Circuits   |                 |           |  |  |
| Unit XI     | II: Magnetism   | Chapter 28, 29  | 2-3 weeks |  |  |
| 1           | Topics: forces on moving charges in magnetic fields, 3 right hand rules, torque on loops of wire, Biot-Savart Law and applications, Ampere's Law and applications   |                 |           |  |  |
|             | Suggested Lab: Current Carrying Wire with Iron Filings  |                 |           |  |  |
| Unit XI     | V: Electromagnetic Induction  | Chapter 30-32   | 3-4 weeks |  |  |
| ך<br>(<br>ז | Topics: magnetic flux, Faraday's law of EM induction, Lenz's law, inductance (including LR and LC circuits), use of differential equations to analyze circuits, Maxwell's Equations   |                 |           |  |  |

Suggested Lab: Motor Lab, LR and LC circuit lab