KAP Physics 140 / AP Physics C
Mr. Herring
Course Procedures & Expectations 2008-2009

Course Goals: Physics is the study of the physical world. We will be exploring the fundamental laws that govern natural phenomena and use those laws to develop theories that can predict the results of future experiments. Using these laws to solve everyday problems is a major goal of this course. This course is designed to be the equivalent of a college-level first semester Physics class. Students will be able to earn college credit by scoring well on the AP Physic Exams. The AP Physic Exams will take place in May.

Requirements: Success in previous science and math classes (B or better) indicates the academic maturity necessary for this course. A thorough understanding of Algebra, Geometry, and Trigonometry is essential to solving many problems. It is strongly recommended that students be concurrently enrolled in Calculus.

Text:
Physics for Scientists and Engineers, 6th edition, by Raymond A. Serway & John W. Jewett
Bring this book with you to every class unless otherwise directed.

Additional Requirements:
1. Scientific calculator (graphing calculator will prove most helpful)
2. Pencil, pen, notebook paper
3. A four color pen (can be bought in class) or four separate colored pens (black, green, red, blue)

Student Expectations:
1. Be ready to begin class when the bell rings.
2. Participate, this is not a course you can sit back and expect to grasp concepts just by watching me. All students are expected to participate and be actively engaged.
3. Do homework practice problems. Practice is essential to understanding Physics.
4. Ask questions. One of the most important ways to learn is from misconceptions.
5. Work together in groups. Collaborate with each other specifically on homework.
6. Do your own work on quizzes and tests. Be responsible and ready.

About attendance:
You are responsible for obtaining any missed assignments and for making them up. This includes getting the class notes, completing homework, and making up any tests, quizzes, or labs. According to school policies, you will have as many days to make up assignments as you have missed; after that they are considered late. You must arrange time with the teacher to make up missed work.

Grading: Your grade will be determined approximately as follows:

Quizzes	50%
Tests	20%
Labs	15%
Homework	10%
Participation	5%

Quizzes: Quizzes are given to determine how successful you are at mastering the material in class. They will cover homework problems and concepts presented in class. Expect one quiz a week most often on Fridays. During the first nine weeks, you will be given the opportunity to make up points on quizzes by scheduling a 1:1 review discussion with me.

Tests: Tests will consist of problems similar to the ones in the quizzes and homework covering all the material in the nine weeks. Expect one test at the end of each nine weeks. The 4th nine weeks test will be a practice AP Physics Exam which all students will take.

Labs: Labs are an excellent method to learn and reinforce Physics concepts. Expect at least one lab every other week and more often one per week. Labs are conducted on double blocks days giving ample time to complete the lab. Students will typically work in student selected groups of three. Tests may include a lab practical component. Each individual student is therefore responsible for understanding how to execute the labs conducted during the year.

Homework: Problems will be assigned nearly every day. There will be challenging problems that we need to go over in class; however, I expect you to make an honest effort before class or before asking for assistance. Struggling is natural, expected, and part of the process to learn Physics. Work in groups to help each other solve challenging problems.

Extra Help: I want to help each student be successful. Often, only a few minutes of small group or 1:1 help with me will greatly improve student understanding. I am often available before and after school and during some periods during the day. The best method is to schedule a time with me during class to meet later. Also, you can email me (rusty_herring@hboe.org)

Mechanics Outline

Mechanics is covered during the fall semester; each subject is covered in the same order as in Serway and Jewett and other standard texts. Concepts and problem-solving techniques are introduced through a combination of lectures, demonstrations, question–answer sessions, and teacher-generated worksheets with the text acting as a back-up resource. Calculus is used where appropriate.

Topic	~ Time (days)	Textbook Chapters	Labs and Demos
I. **SI Units, Dimensional Analysis, and Vectors**	3	1	
II. **Rectilinear Motion** A. Kinematics with time-varying acceleration B. Kinematics with constant acceleration	5	2	Lab: Make x vs t, v vs t, a vs t graphs using Sonic Ranger (2 periods)
III. **Planar motion** A. Kinematics of projectiles B. Kinematics of circular motion	7	3,4	Lab: Pasco's Projectile Launcher (1-2 period), Student conducted.
IV. **Introduction to Newton's Laws** A. Newton's three laws B. Free-body diagrams C. Introduction to weight, normal, and friction forces	5	5	Lab: Measuring the coefficients of friction (1-2 periods), student conducted.
V. **Applications of Newton's Laws** A. Pulley system B. Uniform circular motion C. Nonuniform circular motion D. Nonconstant friction force	8	6	Lab: Centripetal force (1-2 period), student Conducted.
VI. **Work, Energy, and Power** A. Work by constant force B. Work by position-varying Force C. Work–energy theorem D. Power	4	7	Lab: Pasco Work-Energy (2 period), student Conducted. Demo: Running up stairs to measure horse power (30 minutes), teacher led demo.
VII. **Conservation of Energy** A. Energy conservation B. Work by nonconservative forces C. Potential energy functions D. Potential energy vs. position graphs	8	8	Lab: Measuring maximum velocity of a mass on a spring (2 period), student conducted. Lab: Razor Blade lab , (1 period) student conducted.
IX. **Impulse, Momentum, and Collisions** A. Impulse–momentum Relationship B. Conservation of linear Momentum C. Elastic and inelastic collisions D. Position and velocity of center of mass	7	9	Demo: Linear momentum on air track (15-20 minutes), teacher led demo. Lab: Pasco Impulse-momentum (elastic-Inelastic) (2 periods), student conducted.

X. **Rotational Kinematics** A. Kinematics with time-varying angular acceleration B. Kinematics with constant angular acceleration C. Introduction to torque and angular momentum	4	10	
XI. **Rotational Dynamics** A. Moment of inertia B. Newton's laws for rotation C. Conservation of energy with rotation D. Conservation of angular momentum	7	10,11	Lab-Demo: Moment of Inertia (1 period), Student conducted. Demo: Conservation of angular momentum person on stool & rotating bicycle wheel with person on stool (20 minutes each), teacher Led demo.
XII. **Translational and Rotational Equilibrium**	4	12	Demo: Walking the plank (20 minutes), Teacher led demo.
XIII. **Gravitation** A. Newton's law of gravitation B. Energy and angular momentum	6	13	
XIV. **Simple Harmonic Motion (SHM)** A. Kinetics of SHM B. Dynamics of SHM	6	15	Lab: x vs t, v vs t, a vs t of rubber ball pendulum using Sonic Ranger (2 period), student conducted.

Electricity and Magnetism (E & M) Outline

Electricity and Magnetism is covered between the first of January and the administration of the AP Exam. Concepts and problem-solving techniques are introduced through a combination of lectures, demonstrations, lab experiments, question–answer sessions, assignments from the E & M text and teacher-generated worksheets, with the text acting as a back-up resource.

Topic	~ Time (days)	Textbook Chapters (S&J)	Labs and Demos
I. **Charged Particles and Electric Fields** A. Review of the field concept and the definition of the electric field B. Coulomb's Law C. Statics and dynamics of point charges in electric fields	7	23	Demos: Pith balls (10 minutes), Teacher led demo. Lab: Electroscope (1 period), student Conduced.
II. **Electrostatic Fields and Gauss's Law** A. By integration: electric fields of a uniformly charged rod, circular loop, disk, and sheet B. The flux concept and Gauss's law C. Using Gauss's law to determine the electric fields of cylindrically symmetric, spherically symmetric, and planar charge distributions	10	23 24	Demo: Van de Graaff Generator (20 minutes), Teacher led demo.

III **Electric Potential** A. The concept of electric potential B. Calculating the electric potential of various charge distributions C. Equipotential lines and surfaces D. Electric fields as the derivative of the potential	9	25	Lab: Electric Field and Equipotential Lines (1 period), student conducted.
IV. **Capacitors and Dielectrics** A. The concept of capacitance B. Capacitors with planar, cylindrical, and spherical symmetry C. Equivalent capacitance D. Effects of dielectrics in capacitors	8	Ch 26	Demo: Qualitative effects of large capacitors on circuits with light bulbs. (30 minutes), teacher led demo.
V. **Ohm's Law and Direct Current Circuits** A. Resistivity and resistance B. Ohm's Law and Kirchoff's rules applied to DC circuits C. Equivalent resistance D. RC circuits	11	Ch 27 Ch 28	Lab: Holding hands (1/2 period) Lab: Light bulb Circuit (1/2 period) Lab: DC circuits (Kirchhoff's Rules) (2 periods) Lab: Internal resistance (2 periods) Lab: RC circuits (quantitative) (2 periods) All of the above are student conducted.
VI. **Magnetic Forces and Fields** A. The field concept applied to magnetism B. Charged particles in magnetic fields, mass spectrometer C. Current-carrying wires in magnetic fields	7	Ch 29	Demo: Pasco q/m (effect of 'E' and 'B' on electrons) (30 minutes), teacher led demo. Lab: Vernier 'Charged Particles' simulation (2 periods), student conducted.
VII. **Calculating Magnetic Fields** A. Introduction to and applying the Biot-Savan law B. Introduction to and applying Ampere's law	8	Ch 30	
VIII. **Electromagnetic Induction** A. Introduction to Faraday's law and Lenz's law B. Using Faraday, Lenz, and Ohm to determine the induced emf and the magnitude and direction of an induced current C. Inductance and RL circuits D. Maxwell's Equations	5	Ch 31 Ch 32 Ch 34	Demo: Using primary and secondary coils (20 minutes), teacher led demo. Lab: Lenz's Law tube (30 minutes), student conducted. Lab: Induction (1-2 periods) student conducted Demo: Transformers plus electric fence charger holding hands (15 minutes), teacher led demo.