

**KAP Physics 140: Classical Physics & KAP Physics 131: Classical Physics Lab
Course Description & Syllabus
Hilliard Darby High School
2017-2018**

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 full year of college-level Physics. Students can earn college credit by scoring well on the AP Physics Exams which take place in May. Students can also earn college credit through the Kenyon Academic Program (KAP).

Requirements: Success in previous college preparatory 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. Students must be enrolled in Calculus, AP Calculus AB or AP Calculus BC (or have a credit in one of them).

Text:

Physics for Scientists and Engineers, 9th edition, by Raymond A. Serway & John W. Jewett
Students will have access to the online book and a classroom set. The classroom set is to remain in the room at all times. You may not check out books to use in study hall.

Additional Requirements:

1. Scientific graphing calculator (TI-83 or TI-84 preferred)
2. Pencil, pen, notebook paper
3. Folder or binder to organize yourself
4. 3 Ring Binder to put just Labs into

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.
3. Do homework problems. Practice is essential to understanding Physics.
4. Ask questions. One of the most important ways to learn is by asking questions.
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 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 me to make up missed work.

Quizzes (60%): Quizzes are given to determine how successful you are at mastering the material in class. They will cover homework problems, labs and concepts presented in class. They are given every other Friday.

Labs (30%): Labs are an excellent method to learn and reinforce Physics concepts. Each individual student is responsible for understanding how to execute the labs conducted during the year. Each student will keep a lab notebook. The lab book will be collected and graded during the year.

Homework (10%): Problems will be assigned often. There will be challenging problems that we may need to go over in class; however, you are expected 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.

Help: Students are encouraged to seek additional help early. Do not wait until the day of a quiz to seek additional help if you are struggling. Exceptions to this rule would be early-morning study sessions.

Course Outline:

1st Semester – Mechanics

Dimensional Analysis

Motion (1D, 2D, projectile, and circular)

Newton's Laws

Friction

Work, Energy, Power

Impulse, Momentum, Collisions

Rotation

Gravitation and Planetary Motion

Simple Harmonic Motion (This will probably be independent-study)

2nd Semester – Electricity and Magnetism

Charged Particles and Electric Fields

Gauss's Law

Electric Potential

Capacitance

Current and Resistance

Circuits

Magnetic Fields

Inductance

For more information on the Kenyon Academic Program (KAP), go to the following link:
<http://www.kenyon.edu/directories/offices-services/kenyon-academic-partnership/>

I. Mechanics [ch. 1-13,15]

- A. Kinematics (including vectors, vector algebra, components of vectors, coordinate systems, displacement, velocity & acceleration)
 - 1. One-dimensional Motion[ch. 2]
 - 2. Two-dimensional Motion[ch. 4]
- B. Newton's Laws of Motion
 - 1. Static Equilibrium (First Law)[ch. 5]
 - 2. Dynamics of a Single Particle (Second Law)[ch. 5]
 - 3. Systems of two or more bodies[ch. 5]
- C. Work, Energy & Power
 - 1. Work and The Work-Energy Theorem[ch. 7]
 - 2. Conservative Forces and Potential Energy[ch. 8]
 - 3. Conservation of Energy[ch. 7 &8]
 - 4. Power[ch. 7]
- D. Systems of Particles and Linear Momentum
 - 1. Impulse and Momentum[ch. 9]
 - 2. Conservation of Momentum and Collisions (1-D & 2-D)[ch. 9]
- E. Circular Motion and Rotation
 - 1. Uniform Circular Motion [ch. 6]
 - 2. Angular Momentum and its Conservation [ch. 11]
 - 3. Torque and Rotational Statics [ch. 10]
- F. Oscillations and Gravitation
 - 1. Simple Harmonic Motion (dynamics and energy relationships)[ch. 15]
 - 2. Mass on a Spring[ch. 15]
 - 3. Pendulums and other Oscillations[ch. 15]
 - 4. Newton's Law of Universal Gravitation[ch. 13]
 - 5. Orbits of Planets and Satellites (Kepler's Laws)[ch. 13]
 - a. Circular
 - b.

II. Electricity and Magnetism[ch. 23-32]

A. Electrostatics

1. Charge, Fields and Potential[ch. 23]
2. Coulomb's Law & Field and Potential of Point Charges[ch. 23]
3. Fields and Potentials of other charge distributions[ch. 23]
 - a. Planar

B. Conductors, Capacitors and Dielectrics

1. Electrostatics with Conductors[ch. 26]
2. Capacitors[ch. 26]
 - a. Parallel Plates

C. Electric Circuits

1. Current, Resistance and Power[ch. 27]
2. Direct Current Circuits with Batteries and Resistors Only[ch. 28]
3. Capacitors in Series & Parallel[ch. 26]

D. Magnetostatics

1. Forces on Moving Charges in Magnetic Fields (including the Lorentz force law)[ch. 29]
2. Forces on Current-Carrying Wires[ch. 29]
3. Fields of Long Current-Carrying Wires [ch. 29]
4. Sources of the Magnetic Field [ch. 30]

E. Electromagnetism

1. Electromagnetic Induction (Including Faraday's Law and Lenz's Law)[ch. 31]
 - a. RL Circuits & RLC Circuits [ch. 32]
 - b. Oscillations [ch. 32]