

AP PHYSICS
2016-2017: COURSE DESCRIPTION

Name of course: AP Physics Teacher: Ed Hedges Room: 456

Title of textbook: Physics for Scientists and Engineers : 7th edition by Serway

Supplemental: Quick Calculus 2nd edition by Daniel Kleppner & Norman Ramsey

Necessary class materials: You will need a notebook and paper, pencil or pen, and a calculator everyday. A graphing calculator is highly recommended. You may not use your cellphone as a calculator in class.

Course Description:

AP Physics C is a national, calculus-based course in physics. The syllabus for the course is designed by the College Board as a course equivalent to the pre engineering introductory physics course taken by university students. The emphasis of the class will be on understanding the physical laws that govern the world we live in. We will reach this understanding using concepts and skills developed in class discussions and problem solving. The majority of class time is spent developing problem-solving skills, completing labs and producing projects in a cooperative group setting.

This physics course is designed to prepare students for the AP Physics "C" mechanics exam (not the electricity and magnetism section of the exam). Therefore, we will cover a traditional first college semester in the regular high school two semester schedule.

Course Content:

The students in AP physics will be expected to master content in the fields of:

1. Kinematics (including vectors, vector algebra, components of vectors, coordinate systems, displacement, velocity and acceleration)
 - Motion in one, two, and three dimensions including projectile motion.

2. Newton's laws of motion (including friction and centripetal force)
 - Static equilibrium (first law)
 - Dynamics of a single particle (second law)
 - Systems of two or more bodies (third law)

3. Work, Energy, Power
 - Work and work-energy theorem
 - Conservative forces and potential energy
 - Non-conservative forces
 - Conservation of energy
 - Power

4. System of particles, linear momentum
 - Center of mass of multiple particle systems
 - Impulse and momentum
 - Conservation of linear momentum, collisions in 2 & 3 dimension

5. Circular motion and rotation

- Uniform circular motion
- Angular momentum and its conservation
- Torque and rotational inertia
- Rotational kinematics and dynamics

6. Oscillations and gravitation

- Simple harmonic motion
- Mass on a spring
- Pendulums
- Newton's law of universal gravitation
- Kepler's laws

Laboratory experiences: (at least 36 total lab hours out of 175 classroom hours. A minimum of 20% of class time is spent on labs)

College level laboratory work is an integral part of this course. You will be required to create experimental procedures, collect data, analyze that data, and report conclusions for several projects in class.

Labs are conducted in two different styles in this class; investigations and formal lab reports. Investigations are quick type labs to help us verify the physics we see in the course mostly through an inquiry approach to learning. A variety of these are used throughout the year.

Formal lab reports have an outline for submission and must be word processed. They have a higher level of depth and complexity than the investigations. The formal lab reports will be equivalent to the work that is required of a college level first year physics lab report.

Each written lab report will require:

- The formation of an hypothesis or hypotheses based on in-class discussion of the presented problem or focus of each experiment.
- Design of (an) experiment(s), also based on in-class discussion, to test the hypothesis or hypotheses.
- Collection of data and observations.
- Calculations using the collected data.
- Conclusions about how well the hypothesis or hypotheses held up based on the experiment.
- Error analysis.

Students must save all the graded lab reports. They may be required to present the lab reports as a proof of having done these labs when they seek credit for this course in college.

Lab experiences may include but are not limited to the following...

- Graph interpretation
- Establishing derivatives and Integrals as a useful tools in the study of Physics
- Picket Fence Freefall : using photogate and picket fence to collect and analyze data
- Newton's 2nd Law : establishing the relationship of net force, mass and acceleration with motion detectors, smart pulleys, accelerometers and force sensors
- Springs : measuring spring constants and graphing of Hooke's Law
- Atwood's machine : using photogate and smart pulley to measure acceleration of Atwood's machine
- Ballistic pendulum : determining initial speed of a projectile based on apparatus
- Moment of inertia : comparing moment of inertia for a wheel where mass distribution changes
- Simple Harmonic Motion : using motion detector to verify equations defining SHM.
- Projectile motion : using photogates and motion detector to predict motion of projectile.
- Using derivatives and vectors
- Centripetal force: using force sensor and photogate to find force at bottom of swing for pendulum.
- Friction : using force sensors to determine static and motion detectors to determine kinetic
- Mechanical Energy: using photogates to confirm that gravity is a conservative force.
- Momentum: collecting data with photogates about elastic and inelastic collisions
- Rotational Energy: using photogates to compare potential to translational and rotational energies.

Homework: I believe homework is important because it is a valuable aid in helping you make the most of your experience in school. I give homework because it is useful in reinforcing what you have learned in class and helps expand your knowledge into other areas. It is very important that you complete the assignment and turn it in on time. I will be reviewing the homework on the day it is due and therefore I will not accept it late . If you are absent on the day it is due, you must turn it in the day you return. If you are absent the day it is assigned you must get the assignment from me or the website and turn it in within three days of your return. Otherwise it will be given no credit.

GRADING:

Academic Grade: Grade is weighted as A=5, B=4, C =3, D=1, F=0 on transcripts. I grade on a straight scale with 90% - A: 78% - B: 66% - C: 60% - D: Below 60% is a failing grade.

Your grade will be based on the following categories. Tests - 65 %, Labs and activities - 15%, Homework and classwork - 20%.

Citizenship Grade:

Grade is determined by participation, attitude, and the school attendance policies toward tardies. See the planner for further details.

CLASSROOM POLICIES:

Students are expected to

- Be in class with needed materials on time. -Complete all assignments on time.
- Work collaboratively with classmates. -Respect others.

Other things:

- No food, candy, gum or drinks (other than water) are allowed in class.
- No electronics (cell phones, ipods, etc.) are allowed in class. Turn them off.

OFFICE HOURS AND CONFERENCE PROCEDURES:

I am looking forward to a challenging and fun class. I am happy to help students in any way I can. I am available before school and during intervention period almost everyday for tutoring. I will also be available on most Mondays and Wednesdays after school for students that need help.

I can be contacted at the school by phone 223-3121 ex 4456 or by email - ehedges@sandi.net and will usually return messages within 24 hours.

Also, I will be using a web based learning system for the students to keep track of lessons and assignment dates but I have not finalized the site as of the beginning of this school year. I will give notification when the website becomes live. Once online you will be able to find a calendar with information about homework, up coming tests, and homework help.