AP Physics 1 Couture

2015-2016

AP PHYSICS is an elective course and as such a higher quality and level of work is expected on the part of the student than in other courses. The student should spend approximately thirty minutes to one hour of effort each day. This time should be spent reading, data collection, project development and problem solving. Tests and projects are announced in advance of the due date. Usually students have one week to complete their lab reports. Quizzes may or may not be announced.

GRADING POLICY

In accordance to the stated parameters, which are set forth by the Science Department for AP **PHYSICS**, quarter grades will be based on the following

Tests.....55 % of the grade
Labs & Projects.....35 % of the grade
Homework, Quizzes ……....10 % of the grade & Participation

In order for a student to earn an **A-** for the quarter, the student must maintain at least an **A-** test average. I do not change grades for any reason.

REQUIRED MATERIALS

Students will be required to bring with them a pen, and/or pencil. Their AP PHYSICS notebook (three ring binder type suggested) and on the days where appropriate, a lab notebook. A calculator (a standard scientific calculator is fine) is highly recommended.

LABS

Students will be required to keep accurate notebooks of procedures, data, observations, etc. These notebooks will be periodically checked to make sure that the investigations are being completely understood. Lab reports must be prepared to the specifications, which I have prepared for the students. Some labs/projects may be completed with partners, groups, or as individuals.

HOMEWORK

Homework is normally assigned daily. If time permits students may have the time to work on the assignment in class. If not, the student is required to have the homework completed by the next scheduled class period. Normally, I will collect them to make sure that they have been completed. Any questions about the assignment are usually covered during the discussion of the assignment. Therefore, homework is graded as being complete, generally not as being correct.

ATTENDANCE

The Board of Education policy will be adhered to in all of its details. After two tardies, without notes, I will take steps to correct the situation. These punishments may include a call to the parent or guardian, contact with the guidance counselor, detentions, etc.

AVAILABILITY

Mr. Couture is generally available for extra help, make-up work, etc. most days (before or after school) except for Mondays (unless prior arrangements are made) and Fridays. Students are responsible for setting up their own appointments and adhering to them. **If a student misses an assignment, they have three working days to make it up unless other arrangements are made. NO EXCEPTIONS.**

The content for the course is based on six big ideas:

1. Objects and systems have properties such as mass and charge. Systems may have internal structure.
2. Fields existing in space can be used to explain interactions.
3. The interactions of an object with other objects can be described by forces within the system.
4. Interactions between systems can result in changes in those systems.
5. Changes that occur as a result of interactions are constrained by conservation laws.
6. Waves can transfer energy and momentum from one location to another without the permanent transfer of mass and serve as a mathematical model for the description of other phenomena.

The course focuses on seven scientific practices:

1. Use representations and models to communicate scientific phenomena and solve scientific problems;
2. Use mathematics appropriately;
3. Engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course;
4. Plan and implement data collection strategies in relation to a particular scientific question;
5. Perform data analysis and evaluation of evidence;
6. Work with scientific explanations and theories; and
7. Connect and relate knowledge across various scales, concepts, and representations in and across domains.

Topics Covered:

1. Kinematics
    - One Dimensional Motion (including graphing position, velocity, and acceleration)
    - Vectors/Scalars
    - Two Dimensional Motion

2. Dynamics
    - Forces, types and representation
    - Newton's Laws of Motion
    - Interacting objects (systems)

3. Universal Law of Gravitation
    - Circular Motion – kinematics and dynamics
    - Kepler's Laws of Planetary Motion

4. Energy
    - Work
    - Energy
    - Conservation of Energy
    - Power

5. Linear Momentum
    - Impulse and Momentum
    - Conservation of Momentum (Elastic and inelastic collisions)
    - Center of Mass

6. Rotation
    - Rotational Kinematics
    - Rotational Energy
    - Torque and Rotational Dynamics
    - Angular Momentum
    - Conservation of Angular Momentum

7. Simple Harmonic Motion
    - Restoring forces and
    - Simple harmonic motion
    - Simple Pendulums
    - Mass-Spring Oscillators

8. Mechanical Waves and Sound

    - Wave characteristics
    - Waves on a string
    - Sound waves
    - Superposition
    - Resonance, Beats and the Doppler Effect

9. Electrostatics

    - Electric Charge
    - Conservation of Electric Charge
    - Electrostatic Forces, Coulomb's Law

10. Circuits

    - Resistance
    - Ohm's Law
    - Kirchhoff's Laws
    - Simple DC Circuits

Laboratory Investigations and the Science Practices

The AP Physics 1 course devotes 25% of class time to laboratory investigations. The laboratory component of the course allows the students to demonstrate the seven science practices through a variety of investigations in all of the foundational principles.

The students use guided-inquiry (GI) or open-inquiry (OI) in the design of their lab investigations. Some labs focus on investigating a physical phenomenon without having expectations of its outcomes. In other experiments, the student has an expectation of its outcome based on concepts constructed from prior experiences. In application experiments, the students use acquired physics principles to address practical problems. Students also investigate topic-related questions that are formulated through student designed/selected procedures.

All students are expected to keep a lab journal. Students are expected to record their observations, data, and data analyses. Data analyses include identification of the sources and effects of experimental uncertainty, calculations, results and conclusions, and suggestions for further refinement of the experiment as appropriate.

Outside the Classroom Lab Experience:

In addition to labs, students will be required to do one exercise outside of the laboratory experience.

Following the rotation unit, students will pick one of the following projects:

• Students will use a video analysis program to analyze the motion of a toy as it moves (either in a straight line or in a circle). Students will provide the toy and do their own videotaping.

They will then present a description of the analysis both quantitatively and qualitatively, including graphs. Their presentation will be peer critiqued and/or questioned, and they will answer the questions with supporting evidence.

• Using an accelerometer app for their smart phone (SPARKvue is one), students will analyze accelerations they experience every day. They can take the data while moving down the hall between classes, while on the school bus, on an amusement park ride, or anything else they want (within reason – safety first!). Students will present a description of the motion they experienced (not only acceleration, but velocity and displacement, too), both quantitatively and quantitatively, including graphs. Their presentation will be peer critiqued and/or questioned, and they will answer the questions with supporting evidence.

• Students will take two pictures – one of an object in translational equilibrium, and one of an object in rotational equilibrium. The objects also must have more than three forces acting on them. They will then construct free-body diagrams for each object, and determine the magnitude of each force acting on each object. For the object in rotational equilibrium, students will also find the magnitude of each torque acting on the object. Students will present their work in class. Their presentation will be peer critiqued and/or questioned, and they will answer the questions with supporting evidence.

Real World Physics:

In order for students to become scientifically literate citizens, students are required to use their knowledge of physics while looking at a real world problem.

• All students will be assigned to several teams, and each team will research sources of energy (solar, fossil fuels, wind, geothermal, hydroelectric, etc.) and the cost-benefit of each. Students teams will present findings to the class and debate the merits of their assigned energy source.

In addition, students may pick one of the following assignments to complete.

• Students will pick a Hollywood movie and will point out three (or more) instances of bad physics. They will present this information to the class, describing the inaccuracies both qualitatively and quantitatively.

• Students will research a thrill ride at an amusement park. They will present information to the class on the safety features of the ride, and why they are in place.

• Students will present information to the class on noise pollution, and it's danger to both human and animal life. They will also propose solutions to noise pollution problems.

AP Physics 1 exam Structure 3 hours
Assessment Overview
Exam questions are based on learning objectives, which combine science practices with specific content. Students learn to
• Solve problems mathematically—including symbolically
• Design and describe experiments and analyze data and sources of error
• Explain, reason, or justify answers with emphasis on deeper, conceptual understanding
• Interpret and develop conceptual models

Format of Assessment
section i:
Multiple Choice: 50 Questions | 90 Minutes | 50% of Exam Score
• Discrete items
• Items in sets
• Multimark items (two options are correct)

section ii:
Free Response: 5 Questions | 90 Minutes | 50% of Exam Score
• Experimental Design (1question)
• Quantitative/Qualitative Translation (1question)
• Short Answer (3 questions, one requiring a paragraph-length argument)