

Mr. Price  
2016-17  
Marvin Ridge High School

NAME \_\_\_\_\_

## AP PHYSICS 1 SYLLABUS

**Welcome to AP Physics 1!** This is a rigorous, conceptual, mathematically-based university-level experimental science course which involves study of the world around us. Some of the major topics are: motion, forces, gravity, energy, mechanical waves and sound, electrostatics, and DC circuits. This is a **one-semester course** which will be followed by the AP Physics 1 exam in May of 2017. There is a second course, **AP Physics 2**, which will be taught during the spring semester and it covers such topics as thermodynamics, fluid statics, electrostatics, more DC circuits, magnetism, optics, and nuclear physics. This course will have a separate AP exam also given in May of 2017. It is not necessary to take AP Physics 2 in order to take AP Physics 1.

**PREREQUISITES:** “A fourth level math class which requires Math 3 as a pre-requisite” is the minimum prerequisite according to the Union County Public Schools Program of Study. This is usually Pre-Calculus Honors. Math is vital, but not sufficient. You will need to be able to think and explain things mathematically and most importantly, conceptually! This past year, students didn’t even need their calculators to take the Free-Response exam! This is a major shift from AP Physics of just three years ago. Recently, the North-American failure rate in AP Physics 1 is 60%. It’s a tough, conceptual exam!

### **Text:**

“College Physics” 2<sup>nd</sup> Edition, by Knight and published by Pearson. Please take good care of your assigned book. This is a new book and costs around \$150. If you lose it or damage it you will be charged. There is an online edition to this text which can be good! The book will be used as a resource and will not necessarily be used daily.

The course (designed by the College Board) is organized around 7 “Big Ideas,” 7 “Science Practices,” and “foundational physics principles.” I’ll put the entire document on our Canvas Page, but here is the basic organizational breakdown from the College Board:

### **Seven 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.
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.

7. The mathematics of probability can be used to describe the behavior of complex systems and to interpret the behavior of quantum mechanical systems.

### **Seven Science Practices: The student can**

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.
7. connect and relate knowledge across various scales, concepts, and representations in and across domains.

### **Relationship between Big Ideas and Foundational Physics Principles:**

<b>Physics 1 Principles</b>	<b>Big Ideas</b>
1. Kinematics (1D and 2D)	3
2. Dynamics: Newton's Laws	1,2,3,4
3. Circular Motion and the Universal Law of Gravitation	1,2,3,4
4. Simple Harmonic Motion: Simple Pendulum and Mass-Spring Systems	3,5
5. Impulse, Linear Momentum, and Conservation of linear momentum: Collisions	3,4,5
6. Work, energy, and Conservation of Energy	3,4,5
7. Rotational Motion: Torque, Rotational Kinematics and Energy Rotational Dynamics, and Conservation of Angular momentum	3,4,5
8. Electrostatics: Electric Charge and Electric Force	1,3,5
9. DC Circuits: Resistors only	1,5
10. Mechanical Waves and Sound	6
<b>Physics 2 Principles</b>	<b>Big Ideas</b>
11. Thermodynamics: Laws of Thermodynamics, Ideal Gases, and Kinetic Theory	1,4,5,7
12. Fluid Statics and Dynamics	1,3,5
13. Electrostatics: Electric Force, Electric Field and Electric Potential	1,2,3,4,5
14. DC Circuits and RC Circuits (steady-state only)	1,4,5
15. Magnetism and Electromagnetic Induction	2,3,4
16. Geometric and Physical Optics	6
17. Quantum Physics, Atomic and Nuclear Physics	1,3,4,5,6,7

**Basic Outline that we will be following:**

This college-level course contains the basic ideas necessary to build a basic foundation in the subject and to prepare you to take the AP (Advanced Placement) exam in May.

Principle (see above)	Unit	Knight (Chapter)
<b>Term 1</b>		
1. Kinematics	1. Scientific Thinking	1.4
	2. Constant Velocity	1.3, 1.5, 2.-2.3
	3. Constant Acceleration	2.4-2.6
2. Dynamics and Newton's Laws	4. Balanced Forces 5. Unbalanced Forces	4 and 5
<b>Term 2</b>		
	6. Projectile Motion	3.6-3.7
3. Circular Motion and Universal Law of Gravitation	7. Central Net Force and Universal Gravitation	3.8, and 6
7. Rotational Motion	8. Rotational Motion and Torque	7 and 8.1
5. Momentum	9. Impulse, Force/Momentum	9
<b>Term 3</b>		
6. Work, Energy, and Power	10. Work, Energy, and Power	10, 8.3
4. Simple Harmonic Motion; 10. Mechanical Waves and Sound	11. Oscillations, Simple Harmonic Motion, Waves and Sound	14, 15, 16.1
8. Electrostatics	12. Electrostatics: electric charge and electric force	20.1-20.3
9. DC Circuits	13. DC Circuits: resistors only	22 and 23
	Exam Review	
	Exam	

**BEHAVIOR:** I expect cooperation in maintaining an environment conducive to learning. The following general expectations are to be followed:

1. Be prompt getting to class and into your assigned seat.
2. Treat others with respect.
3. Follow directions.
4. Only open your Chromebook when instructed.
5. Follow school policy with regards to your cell phone.

6. Be prepared for class. Have your book, calculator, pen/pencil, notebook/folder, etc. ready when class begins.
7. Work together with your table group when instructed, but otherwise do your own work. Cheating will not be tolerated.
8. Do not deface school property. Please do not write on desks, tables, etc.

**ASSIGNMENTS:** I will write assignments on the whiteboard. YOU are responsible for writing the assignment in your assignment notebook and for turning in the assignment on time. Assignments are normally due at the beginning of class. LATE HOMEWORK turned in within 1 day will be accepted but subject to 50% grade reduction. Late lab reports will be docked 10% per day late. If you are sick the day an assignment is due, it is due the next day you are in class. If you are absent the day an assignment is given, you have 2 class days to turn it in.

**CANVAS:** I will try and post SmartBoard notes on Canvas daily. I will also put other pertinent information there as study aides.

**GRADING POLICY:** Each assignment will be given a point value. Smaller assignments will be worth fewer points. Term grades will be calculated by using the following formula:

$$(\text{your total points}) / (\text{total possible points}) \times 100 = \text{percentage grade.}$$

Tests will comprise approximately 50-60% of your term grade. You will also be given grades on labwork, quizzes, notebook, and classwork/homework. Occasionally we will do a formal lab write-up. Homework problems will be assigned worksheets and also problems from the book and released AP test items. The homework assignment is your opportunity to practice. An honest effort must be shown on every problem. I do not give extra credit.

The semester exam will be given in January and the AP exam will be on the afternoon of Tuesday May 2. If you take AP Physics 2 during the semester 2, that AP exam will be given the next afternoon on Wednesday May 3. So, keep your notes and other papers until the end of the course.

**CALCULATORS:** You will need a graphing calculator for this class. Either a TI-84 or 83 will be fine. You will NOT be able to borrow calculators from math teachers this year, so make sure you bring yours to class each day.

**SUPPLIES NEEDED:** In addition to a graphing calculator, you will need the following:

Three ring binder (1 inch) for organizing your handouts and assignments. You may want some dividers...

Metric ruler (15 or 30 cm)

Small plastic protractor

Composition Graph ruled notebook (has 100 sheets, 9  $\frac{3}{4}$ " X 7  $\frac{1}{2}$ ". I have a supply of these from the student store that we will sell for \$2.00 each. This will be your main notebook for the duration of the course. Please leave the first page blank (front and back). You will use this page for your table of contents. You will need to number the pages as you go along.

Box of Kleenex to bring to the class! I will try and keep a box of Kleenex at the front of the room. Hopefully we will have enough to last the semester.

**GENERAL COMMENTS:** Much of this course will be guided inquiry and modeling. This will require you to think and to work collaboratively in small groups. The purpose of this approach is for you to develop conceptual thinking and analytical processing skills. This is so important in a subject like physics.

I ask that each of you give your best effort in class. I expect that you will work hard, to the best of your ability. Please show your work to your parents as the year goes on. Parents will be able to view their child's progress on the Parent Assistant Module.

### **Extra Help**

If a student is in need of extra help, please ask during class time and/or go to other students or the textbook. If that is still not enough, I have two official tutoring times that are open to students in any of my classes: Tuesday AM (7:20-7:50 except when I have morning duties assigned by the administration) and Thursday afternoon (3:00 – 3:30). If additional tutoring is requested above class time and tutoring times, there are sometimes outside tutors available who charge by the hour.

Please sign below indicating that you have read the syllabus. Thank you!

\_\_\_\_\_  
Student Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Parent Signature

\_\_\_\_\_  
Date