**Mrs. Tomb’s AP Physics 1 Syllabus 2014-15 Edition**

**Course Overview**

Advance Placement Physics 1 is an algebra-based college physics course which examines the physical laws and principles that govern nature. The general areas that are studied are: motion, forces, energy, mechanical waves; electricity. The course will take these topics and not only provide information about them, but will also show how these topics are relevant for the student's life. Emphasis will be placed on understanding the concepts of physics and then to analyze the concepts mathematically. The problem solving skills developed in this course are transferable to many areas outside of physics.

The course content is based on six big ideas:

**Big Idea 1:** Objects and systems have properties such as mass and charge. Systems may have internal structures.

**Big Idea 2**: Fields existing in space can be used to explain interactions.

**Big Idea 3**: The interactions of an object with other objects can be described by forces.

**Big Idea 4**: Interaction between systems can result in change in those systems.

**Big Idea 5**: Changes that occur as a result of interactions are constrained by conservation laws.

**Big Idea 6**: Waves can transfer energy and momentum from one location to another without permanent transfer of mass and serves has a mathematical model for the description of other phenomena.

The course is designed to be useful to students having widely differing backgrounds and career plans. Laboratory work is a vital and essential part of this course. As much as possible, students will have a "hands-on" involvement with the material so as to actually see and experience what it is that is being learned. Formally written laboratory reports are required. **Students should expect to have an assignment every day.** This course meets every day for 45 minimum and additional 45 minimum every other day – for a total of 315 minutes of class type per week.

**Course Materials**

Primary Textbook: James S. Walker, *Physics, AP\* Edition, 3rd ed.*, Prentice Hall, Upper Saddle River New Jersey, 2007.

Lab Notebook, Composition notebook, **scientific calculator**, protractor, ruler

**Academic discipline**

Physics is the most fundamental of all the sciences. We would not have our understanding of the human genome, polymers, or the technology required to make integrated circuits if it weren’t for the work done in the field of physics over the last century. Physics, like the other sciences, involves the systematic process of finding relationships that exist in the physical world. It involves trying to find the simplest explanation or expression of those relationships. Unfortunately, the world in which we live is very complex. It is difficult to isolate one relationship at a time. For this reason, when studying physics, it is necessary to consider multiple ideas or concepts at the same time. This is, in part, what makes physics challenging. However, with perseverance, practice, and hard work, studying physics can be rewarding. Your understanding of the world in which you live and work will be forever changed and you will see things in a new light.

**Student Learning**

Learning is a highly individual and personal process. There is nothing anyone can do to make you learn something. You must attend to the process of learning. You must strive to comprehend the concepts and you must practice much like an athlete would practice for an athletic contest. Learning is not a passive event, but it is a process that involves discipline, perseverance, and motivation. Studying is your practice; the more you do, the better you will perform. Completing homework assignments is only one component of studying.

**Grading**

All grades are submitted based on the amount of points accumulated per quarter and divided by the total points possible from the following areas: The grades are weighted to each category.

          \***Tests/Quizzes**:  Worth 5 - 100 points.  Tests will be given based on the material covered in class and material from the book.  Generally, there will always be a test or quest following a chapter in the book. One quarter test is given as well. Tests include multiple choice, short answer/extended responses, true/false, matching, some drawing or diagramming. Units/Quarter Test resembles the AP format as much as possible. Quizzes will be announced or unannounced. Bell quizzes are given at the beginning of class. If absent or late; quizzes **aren’t made up**. For every 5 bell quizzes given, the lowest one is dropped. If you are absent prior day of quiz – you are expected to take the quiz. Bell quizzes are open note and book. (**Worth 25% test; 25 quiz of grade)**

 **\*Classwork/Labs:** Labs are generally worth a minimum 30 points. (See Lab Report Handout for format) This is HUGE part of the grade. Classwork is always collected and is worth 5-40 points based on the amount of work required for each assignment. (**Worth classwork is 20% and lab is 20% of grade**)

          \***Homework**: Worth 5-25 points based on the amount of work required for each assignment.  Homework assignments are collected weekly**. (Worth 10% of grade)**

**Grading done by District Guidelines**

100-90% A

89-80% B

79-70% C

69-60 D

59 Below E

**Mrs. Tomb’s role**

While it is your responsibility to attend to the learning process, as your instructor it is my responsibility to intend for you to learn physics. I will select and structure activities that will provide opportunities for you to understand the concepts and learn to solve appropriate problems. I will provide examples for how to solve problems, collect and analyze data, and draw conclusions. I will monitor your progress and give you knowledge of your progress. In the end, I will determine the extent to which you have mastered the material in the class and prepare you to take the AP Physics 1 exam.

**General Information:**

I check my email everyday including the weekend, if notification of a grade/situation is urgent it is best to email me! My personal email: **chris.tomb@WESchools.org** Some student projects are optional group work, students may choose to work alone! **Homework or Assignments are due at the beginning of class when collected**. –Big pet peeve – Don’t ask to go to your locker to get your homework/assignment – it will be still be considered late. I have a website with all the class assignments, notes, link you name it is there. <http://www.tombphysics.weebly.com>

**Teaching Mission Statement:**

 I will inspire my students to understand that learning is a process. Learning is a type of process which always amazing, it is around every corner and it is never ending. I will educate my students to recognize learning is also a process of self-discovery, self-realization and most importantly, learning is a process in which everyone can succeed.

“The greater danger for most of us lies not in setting our aim too high and falling short; but in setting our aim too low, and achieving our mark.” [*- Michelangelo*](http://www.basicquotations.com/index.php?aid=279)

Guidelines/Rules/Reminders:

I will be following and enforcing all guidelines in the Student Handbook in addition to the following:

1. Be seated in your **assigned seat** and have all necessary materials for class: books, binders, pencils, paper, and **calculators**. If you are unprepared and not in your seat when the bell rings, I will consider you tardy. – I do bell work often and you won’t receive all the points. ![MCj04238440000[1]]()
2. **You must respect the rights of the other students to learn**. If you are asked to stop inappropriate behavior you will stop disrupting class immediately. If you are asked a **2nd,** you will receive a **school detention** and a **call home**. 3rd request - you will be **removed from the classroom and receive a failing grade** for any grades incurred for that class period. This applies to all reviews, assignments, tests, and even the final test. **THE MOST COMMON VIOLATION IS TALKING IN CLASS WHEN YOU SHOULD BE LISTENING**. ![MMj02951510000[1]]()
3. I will not tolerate cellular phones, headsets, or any other recreational technological devices other than a calculator in the classroom. They will be confiscated if detected, **including games on calculators**.  When confiscated, it is an automatic discipline referral and the device is sent to the assistant principal. ![MCj04238220000[1]]()
4. **Absolutely no eating, drinking or selling candy during class**. I will throw away any food or drink brought into my classroom. We will be working with hazardous chemicals that can contaminate your food or drink and result in much unpleasantness. All students will sign a lab agreement in greater detail about lab behavior. ![MCj04061620000[1]]()![MCj03253060000[1]]() **Plus it is just plain rude!!!**
5. **Copying work is a form of cheating. Learning science requires that you practice and work problems on your own to grasp the concepts. Copying will only leave you stranded during a test or lab. If I catch you cheating (and I am looking) I will confiscate your work and you will receive a ZERO. The student providing answers is as guilty as the student copying, and each will receive a score of ZERO on that assignment. A second offence will result in an E for the nine weeks. A third offence may result in the failure of the course. ![MCj04238440000[1]]()**
6. During class you are only to be working on what I assign. Doing work from other classes is prohibited unless I have given you permission to do so. I will inform other teachers that you were doing their work in my class and confiscate that work.
7. You have 2 days for each day of excused absence to turn in make up work for credit. You are responsible for any missed work – just go to my **website** [**http://www.tombphysics.weebly.com**](http://www.tombphysics.weebly.com) to find out what you missed. **IF YOU HAVE AN UNEXCUSED ABSENSE – A ZERO WILL BE GIVEN FOR THAT ASSIGNMENT**. Missed labs and tests must be made up after or before school according to my schedule. If you are an unexcused absence – a zero will be given for a test if you miss it – Ouch. It is your responsibility to find out what was missed and make up the work on time. Work not made up on time receives a grade of zero. If you miss class to attend a field trip, meeting or other school activity, you must notify me at least 2 days beforehand to receive the work that you will be missing. In these cases you have one day to turn in or make up any assignments.
8. All homework must be completed and ready to be checked at the beginning of class. You will not be permitted to go to your locker to get homework; all work must be in class when it begins. – Just put it in the proper bin at the beginning of class or have it done in your composition notebook.
9. No assignments will be given over breaks.
10. **Binders:** I will require each student to keep a neat and well organized binder. Keeping a binder will allow you to keep track of your grade. I will be checking and grading binders after each test. All binders should contain this syllabus, assignment sheet, formula sheets, and all other reference sheets I pass out. Credit will not be given for missing documents. Hint – well kept binder will benefit you at final time.

            **Binder Requirements:**

All students are **required** to have a 2” binder, organized with dividers. (I will give Sept 5, 201 4 to have it or points will be lost).

It must contain all work up to the current date 3-hole punched and in the appropriate section/chapter.

     \*3-Ring Binder –. Name, course and class periods will be written in permanent marker on front and sides.

   \* Organization – all materials must be in the order assigned, starting with the beginning of the year

 \* Neatness – all information in the binder must be readable. Sloppy, scattered or illegible writing or crumpled pages will receive a grade that reflects the effort.

**Course Objectives (Learning Outcomes)**

This course is intended to prepare the student for the AP Physics 1 college exam. By the end of the year, students will have developed an understanding of each of the topics covered and should be able to do the following:

* Formulate hypotheses referencing prior research and knowledge.
* Design procedures to test hypotheses.
* Conduct systematic controlled experiments to test hypotheses
* Apply simple statistical methods to make predictions and test the accuracy of results.
* Report, display, and defend the results of investigations to audiences.
* Explain the criteria that scientists use to evaluate the validity of scientific claims and theories.
* Analyze factors that influence the relative motion of an object.
* Analyze the effects of gravitational, electromagnetic and other forces on a physical system.

This will be accomplished through discussion of physics concept, projects, and solving problems using equations at the end of each chapter. A laboratory exercise each unit will reinforce the material from each chapter and show how to collect and analyze data. The course topics include:

**Unit 0 - The Study of Physics — Chapter 1**

1. Scientific Method

2. Measurement and Mathematics

**Unit 1 - Newton Mechanics**

A. Kinematics (**Big Idea 3)**

1. Motion in one dimension — Chapter 2

a. Position, distance and displacement - **Sec: 2.1**

b. Average speed and velocity / instantaneous velocity - **Sec. 2.2-2.3**

c. Acceleration – **Sec 2.4**

d. Motion with constant acceleration – **Sec. 2.5-2.6**

e. Free falling – **Sec. 2.7**

2. Uses of Vectors — Chapter 3

a. Scalar vs. vectors – **Sec. 3.1**

b. Components of vectors – **Sec. 3.2**

c. Adding / subtraction of vectors/unit vectors - **Sec. 3.3-3.4**

d. Position, displacement, velocity and acceleration vectors - **Sec. 3.5**

e. Relative motion – **Sec. 3.6**

3. Motion in two dimensions — Chapter 4

a. Motion in two dimension - **Sec. 4.1-4.3**

b. Projectile motion – **Sec. 4.4**

B. Newton’s laws of motion — Chapters 5 & 6 **(Big Idea 1, 2, 3 & 4)**

1. Static equilibrium (1st law)

a. Force and mass - **Sec. 5.1**

b. Newton’s First & Second Law of Motion - **Sec. 5.2-5.3**

c. Newton’s Third Law**- Sec 5.4**

2. Dynamics of a single particle (2nd law) - **Sec. 5.5-5.7**

a. Normal forces

b. Weight

3. Systems of two or more bodies (3rd law)- **Sec. 6.1-6.4**

a. Frictional forces

b. Strings and springs

c. Translational equilibrium

d. Connected objects

4. Uniform Circular Motion **(Big Idea 1, 2 3 & 4)**

a. circular motion - **Sec. 6.5**

**Unit 2 – Work / Energy**

A. Work, energy and power — Chapters 7 & 8 **(Big Idea 3, 4 & 5)**

1. Work and the work-energy theorem - **Sec. 7.1-7.3**

a. Work done by a variable force

2. Power - **Sec. 7.4**

3. Conservative forces and potential energy - **Sec. 8.1-8.4**

a. Conservative and non-conservative forces

4. Conservation of energy

**Unit 3 – Momentum**

A. Systems of particles, linear momentum — Chapter 9 **(Big Idea 3, 4 & 5)**

1. Impulse and momentum- **Sec. 9.1-9.3**

a. Momentum & Newton’s Second Law

2. Conservation of linear momentum, collisions -**Sec. 9.4-9.6**

a. elastic & non elastic collisions

3. Center of Mass - **Sec. 9.7**

**Unit 4 - Rotational Motion/ Gravitation**

A. Circular Motion and Rotation — Chapters 10 & 11 (**Big Idea 3, 4, & 5)**

1. Angular position, velocity, and acceleration – Sec. 10.1

a. Rotational kinematics – Sec. 10.2

b. Linear and rotational quantities – Sec. 10.3

2. Torque and rotational statics – **Sec. 11.1-11.3**

3. Rotational kinematics and dynamics – **Sec. 11.4**

4. Angular Momentum and Conservation of Angular Momentum– **Sec. 11.6-11.7**

B. Gravitation — Chapter 12 **(Big Idea 1, 2 3 & 4)**

1. Newton’s law of gravity - **Sec. 12.1-12.2**

2. Orbits of planets and satellites – **Sec. 12.3-12.5**

a. Kepler’s Laws

b. General

**Unit 5 – Waves / Vibrations / Sounds**

A. Oscillations about equilibrium — Chapter 13 **(Big Idea 6)**

1. Simple harmonic motion (dynamics and energy relationships) – **Sec. 13.1**

a. Periodic Motion

2. Mass on a spring – **Sec. 13.2-13.5**

3. Pendulum and other oscillations – **Sec. 13.6**

B. Wave motion — Chapter 14

1. Traveling Waves – **Sec. 14.1**

a. Types of waves

2. Wave Propagation – **Sec. 14.2-4**

3. Standing Waves

a. Sound intensity – **Sec. 14.5**

b. The Doppler Effect – **Sec. 14.6**

4. Superposition – **Sec. 14.7-14.8**

a. Interference

b. Beats – **Sec. 14.9**

**Unit 6 – Electricity – Circuits**

A. Electrostatics — Chapter 19 **(Big Idea 1, 3 & 5)**

1. Charge and Coulomb’s Law – **Sec. 19.1-19.3**

2. Electric field and electric potential (including point charges) – **Sec. 19.4**

4. Fields and potentials for charge distributions

B. Conductors and capacitors — Chapter 20

1. Electrostatics with conductors – **Sec. 20.1-20.2.**

2. Capacitors – **Sec. 20.5-20.6**

a. Capacitance

b. Parallel plate

c. Spherical and cylindrical

3. Dielectrics

C. Electric circuits — Chapter 21 **(Big Idea 1 & 5)**

1. Current, resistance, power – **Sec. 21.1-21.4**

2. Kirchoff’s Rule – **Sec. 21.5**

3. Ammeters and Voltmeters – **Sec. 21.8**

**Laboratory & Activities:**

Laboratories are constructed to provide the students will the opportunities to work collaboratively with other students. Students are given open ended, guided lab and computer simulations throughout the year to reinforce and develop concepts taught. Students will be given lab objectives on different topics and work with Pasco Labs, Data Studio and other lab equipment to reach formulated hypothesis, collect and analyze data and draw conclusions based upon their results. Students will be required to share their results with the class as discussions’.

Labs and activities will reinforce the seven science practices.

**Science Practice 1**

The student can use representations and models to communicate scientific phenomena and solve scientific problems.

**Science Practice 2**

The student can use mathematics appropriately.

**Science Practice 3**

The student can engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course.

**Science Practice 4**

The student can plan and implement data collection strategies in relation to a particular scientific question. (Note: Data can be collected from many different sources, e.g., investigations, scientific observations, the findings of others, historic reconstruction and/or archived data.)

**Science Practice 5**

The student can perform data analysis and evaluation of evidence.

**Science Practice 6**

The student can work with scientific explanations and theories.

**Science Practice 7**

The student is able to connect and relate knowledge across various scales, concepts and representations in and across domains.

Students will be required to complete formal lab reports for each lab. The formal report will be in their lab notebook and will include:

1. Title
2. Background/Discussion
3. Materials Needed
4. Experimental Procedures
5. Data/Graphs
6. Analyze Data
7. Conclusion

 A minimum of 20% of this course will be lab work.

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| --- | --- | --- | --- | --- |
| **Unit Covered** | **Lab/Activity** | **Topic** | **Type** | **Objective** |
| Unit - OThe Study of Physics | 1. Precision/Accuracy Measurement Lab
2. Metric Measurement Lab
 | Measurements; Significant Figures; Metric Prefixes  | Activity/Inquiry | Refresher for units and conversions.  |
| Unit 1A – Newtonian Mechanics  | 1. Constant Velocity – Speed
 | Velocity/Speed  | Inquiry Lab | Measure distance and time during constant velocity (speed) movement. Determine average velocity (speed) as the slope of a “Distance vs. Time” graph. |
| 1. Acceleration Down an Incline
 | Acceleration | Inquiry Lab | 1.Examine the acceleration of an object rolling down an inclined plane.2.Determine the shape of a “Distance vs Time” graph for an accelerating object.3.Determine the mathematical relationship between the distance and time an object travels while it is accelerating. |
| Unit 1A– Newton Mechanics Continued | 1. Free fall
 | Free Fall | Simulation  | 1. Examine distance-time and velocity-time graphs of a freely falling object. 2. Determine the acceleration due to gravity of an object in "free fall." |
| 1. Relative Velocity (Speed)
 | Relative Speed | Inquiry Lab | 1. Determine average velocity (speed). 2. Predict the relative velocities (speeds) of the two objects traveling in the same and in the opposite directions.3. Measure the relative velocities (speeds) and compare with predictions. |
| 1. Soccer Ball Kick
 | Projectile Motion | Inquiry Lab  | 1.Determine the initial velocity of a projectile by measuring the amount of time it is in the air, the horizontal distance it travels during that time, and applying these values to a few simple calculations |
| Unit 1B – Dynamics (Laws of Motion)  | 1. “Getting Pushy”

Newton’s Second Law of Motion | Laws of Motion | Inquiry Lab | 1.To explore and use the relationship between force, mass and acceleration and to investigate the amount of acceleration or an object when a net force is acting on it. |
| 1. Constant Force – Changing Mass
 | Laws of Motion | Guided Lab | 1.To investigate the effect of increases in mass on an accelerating system. |
| 1. Constant Mass – Changing Force
 | Laws of Motion | Guided Lab | 1. To investigate the how increasing the applied force affects the acceleration of a systems. |
| 1. Egg Drop
 | Newton Laws | Project | To explore Newton’s Laws of Motion  |
| 1. Spring Force
 | Hooke’s Law | Guided Lab | 1.To investigate Hooke's Law (The relation between force and stretch for a spring)2.To investigate Newton's Laws and the operation of a spring scale. |
| 1. Centripetal Force Lab
 | Centripetal Force | Guided Lab | 1.To study the nature of centripetal force2.To graph to relationship between centripetal force, mass, radius and velocity. |
| 1. Determine the coefficient of friction
 | Friction Static & Kinetic | Inquiry Lab | 1. Calculate the coefficients of static and kinetic friction between several surfaces |
| 1. Forces (Web)
 | More Friction | Simulation Phet | 1.Reinforce ideas of friction and forces on an incline plan |
| Unit 2 – Energy & Work  | 1. Rate of Power and Work Lab
 | Work /Power | Inquiry Lab | 1. Determine the power in running up and down stairs and the work involved.  |
| 1. Conservation of Energy
 | Energy | Inquiry Lab | 1.Determine the gravitational and kinetic energy of a rolling ball.  |
| 1. Conservation of Energy – Mass Spring Systems
 | Energy | Simulation Phet | Reinforces the conservation of energy principles.  |
| Unit 3 – Momentum | 1. Momentum Bashing
 | Momentum | Guided  | 1. Understand what happens in a car crash, it helps to see how force, inertia, and velocity are related |
| 1. One Dimensions Collisions
 | Collisions | Phet Simulation | 1.Determine the type of collisions; inelastic and elastic collisions. |
| 1. Conservation of Momentum
 | Conservation of Momentum | Phet Simulations | 1.Predict, compare and describe the speed and direction of collisions.  |
| Unit 4- Rotational Motion & Gravitation | 1. Torque
 | Torque | Inquiry | 1.Determine the amount of torque on an object. |
| 1. Torque and Balance
 | Rotational Equilibrium  | Guided | 1.Verify the two conditions for equilibrium by examining the total amounts of upward and downward force and the total amounts of clockwise and counterclockwise torques. |
| 1. Ladybug Lab
 | Angular Kinetmatics | Phet simulation | 1.Determine the relationships between linear and angular kinematics.  |
| Unit 5 - Waves / Vibrations / Sounds | 1. The Pendulum Lab
 | Period/Frequency | Guided  | 1. To determine if/how mass, length, and angular displacement (amplitude) affect the period of a simple pendulum |
| 1. Period of Mass Spring systems
 | Period/Frequency | Guided | 1.To determine how the spring constant and mass affect the period of a mass spring system. |
| 1. Speed of Sound
 | Resonance | Inquiry | 1.Calculate the speed of sound in a closed tub |
| Unit 6 – Electricity & Circuits | 1. Electric Charge
 | Electroscope | Inquiry | 1.Determine what types of materials lose and gain charge. |
| 1. Electric force and fields lines
 | Coulumbs Law | Phet Simulation | 1.Determine how charge and location affects the electric force and electrical field lines. |
| 1. Simple Circuits
 | Circuits | Inquiry | 1.Construct simple parallel and series circuits. |
| 1. Series Circuits
 | Ohm’s Law | Inquiry | 1.Using Ohms Law with the series to verify the current and voltage of different series circuits.  |
| 1. Parallel Circuits
 | Ohm’s Law | Inquiry | 1.Using Ohms Law with the parallel to verify the current and voltage of different series circuits. |
| 1. Resistances in a Circuit
 | Resistance | Inquiry | 1.Experiment with variables that contributes to the operating of an electric circuit.  |

**Cell & Electronic Gadget Policy – Addendum**

1. All cells phone and other electronic gadgets are not needed in physics classroom; therefore, they should not be used.

2. The BUCKET method will be employed. If an electronic device is out during class, I will ask you nicely to please put it in the bucket on my desk (I will return immediate after class ends). I expect you nicely to place it in the bucket - if you refused, I will kindly ask you to go to SMR and a discipline referral will be written for insubordination. Students are losing valuable time on task due the disruption the electronic device.

3. If at ANYTIME during a TEST, QUIZ, CLASSWORK, OR LABS are being conducted and the cell phone is out (even if you only have it out) – you WILL RECEIVE AN IMMEDIATE ZERO FOR WHATEVER you are/were working on.

Unfortunately this extremely consequences are from many years of past experiences with students who like to take pictures of the test/classwork. Students are constantly checking twitter, instragram and texts during class - constantly interfering with the learning process. Students need to understand how and when to use their electronics properly.

I have read and fully understand the policies listed in the syllabus and the addendum.

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Cell Phone/Syllabus

Student Signature\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Parent’s Signature\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_