#

AP Physics 1

P3/4/6

# COURSE SYLLABUS

## COURSE OVERVIEW & INSTRUCTIONAL GOALS

AP Physics-1 is a non-calculus physics course designed to be the equivalent of the college physics course. Usually taken during the first year of college. This course will include an extensive theoretical and mathematical studyof mechanics, electricity, magnetism, light, sound, and relativity. Students should expect to spend additional time to

successfully complete this course.

The AP Physics 1 course is conducted using **inquiry-based instructional strategies** that focus on experimentation to develop students’ conceptual understanding of physics principles. The students begin studying a topic by making observations and discovering patterns of natural phenomena. The next steps involve developing, testing, and applying models. Throughout the course, the students construct and use multiple representations of physical processes, solve multi-step problems, design investigations, and reflect on knowledge construction through self-assessment rubrics.

In most labs, the students use probeware technology in data acquisition. In the classroom, they use graphing calculators and digital devices for interactive simulations, Physlet-based exercises, collaborative activities, and formative assessments.

LABORATORY INVESTIGATIONS AND THE SCIENCE PRACTICES

The AP Physics 1 course devotes over 25% of the time to laboratory investigations. [CR5]

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 laboratory 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 investigations are reported in a laboratory 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. [CR7]

At the end of this course, you will be able to:

|  |  |
| --- | --- |
|  Curricular Requirements  | Page(s)  |
| CR1  | Students and teachers have access to college-level resources including college-level textbooks and reference materials in print or electronic format.  | 1  |
| CR2a  | The course design provides opportunities for students to develop understanding of the foundational principles of kinematics in the context of the big ideas that organize the curriculum framework.  | 1  |
| CR2b  | The course design provides opportunities for students to develop understanding of the foundational principles of dynamics in the context of the big ideas that organize the curriculum framework.  | 1  |
| CR2c  | The course design provides opportunities for students to develop understanding of the foundational principles of gravitation and circular motion in the context of the big ideas that organize the curriculum framework.  | 2  |
| CR2d  | The course design provides opportunities for students to develop understanding of the foundational principles of simple harmonic motion in the context of the big ideas that organize the curriculum framework.  | 2  |
| CR2e  | The course design provides opportunities for students to develop understanding of the foundational principles of linear momentum in the context of the big ideas that organize the curriculum framework.  | 2  |
| CR2f  | The course design provides opportunities for students to develop understanding of the foundational principle of energy in the context of the big ideas that organize the curriculum framework.  | 2  |
| CR2g  | The course design provides opportunities for students to develop understanding of the foundational principles of rotational motion in the context of the big ideas that organize the curriculum framework.  | 3  |
| CR2h  | The course design provides opportunities for students to develop understanding of the foundational principles of electrostatics in the context of the big ideas that organize the curriculum framework.  | 3  |
| CR2i  | The course design provides opportunities for students to develop understanding of the foundational principles of electric circuits in the context of the big ideas that organize the curriculum framework.  | 3  |
| CR2j  | The course design provides opportunities for students to develop understanding of the foundational principles of mechanical waves in the context of the big ideas that organize the curriculum framework.  | 3  |
| CR3  | Students have opportunities to apply AP Physics 1 learning objectives connecting across enduring understandings as described in the curriculum framework. These opportunities must occur in addition to those within laboratory investigations.  | 9  |
| CR4  | The course provides students with opportunities to apply their knowledge of physics principles to real world questions or scenarios (including societal issues or technological innovations) to help them become scientifically literate citizens.  | 9  |
| CR5  | Students are provided with the opportunity to spend a minimum of 25 percent of instructional time engaging in hands-on laboratory work with an emphasis on inquiry-based investigations.  | 4  |
| CR6a  | The laboratory work used throughout the course includes investigations that support the foundational AP Physics 1 principles.  | 4, 5, 6, 7, 8  |
| CR6b  | The laboratory work used throughout the course includes guided-inquiry laboratory investigations allowing students to apply all seven science practices.  | 4, 5, 6, 7, 8  |
| CR7  | The course provides opportunities for students to develop their communication skills by recording evidence of their research of literature or scientific investigations through verbal, written, and graphic presentations.  | 4  |
| CR8  | The course provides opportunities for students to develop written and oral scientific argumentation skills.  | 10  |

#### NEEDS AND RESOURCES

### Prerequisite courses, knowledge, and skills:

### To successfully complete this course, you must

Have completed Chemistry and Algebra II with a B or above.

### Required Materials

### To successfully complete this course, you will need

* Equipment for class: All students must come to class equipped13 as well as prepared.

Proper equipment consists of the following:

* AP PHYSICS –1 book
* A Pen and a pencil
* Calculator must have basic arithmetic functions plus trig functions, log functions,exponential notation.
* Textbook may be required only with given notice. (We will be using the textbook as a reference to support classroom lectures and labs. We will also use it for homework assignments when appropriate.
* Science Portfolio As new work frequently builds on old, maintaining an organized portfolio is critical in physics. For this reason, you must organize and maintain a dedicated 1”3ring binder for your class. It should have sectional tab dividers for each unit, and its pages will be accurately numbered. In it students will put readings with reflections, homework, worksheets, and lab reports.

##### Print Resources

* *Physics, Giancoli, 6 t h edition*.

### COURSE SCHEDULE

**AP® Physics 1 Sample Syllabus 1** Syllabus 1066422v1

**UNIT 1. KINEMATICS [CR2a]**

1. Kinematics in one-dimension: constant velocity and uniform accelerated motion
2. Vectors: vector components and resultant
3. Kinematics in two-dimensions: projectile motion

**Big Idea 3**

**Learning Objectives:** 3.A.1.1, 3.A.1.2, 3.A.1.3

**UNIT 2. DYNAMICS [CR2b]**

1. Forces, types, and representation (FBD)
2. Newton’s First Law

CR1— Students and teachers have access to college-level resources including college-level textbooks and reference materials in print or electronic format.

CR2a— The course design provides opportunities for students to develop understanding of the foundational principles of kinematics in the context of the big ideas that organize the curriculum framework.

CR2b— The course design provides opportunities for students to develop understanding of the foundational principles of dynamics in the context of the big ideas that organize the curriculum framework.

**AP® Physics 1 Sample Syllabus 1** Syllabus 1066422v1

1. Newton’s Third Law
2. Newton’s Second Law
3. Applications of Newton’s Second Law
4. Friction
5. Interacting objects: ropes and pulleys

**Big Ideas 1, 2, 3, 4**

**Learning Objectives:** 1.C.1.1, 1.C.1.3, 2.B.1.1, 3.A.2.1, 3.A.3.1, 3.A.3.2, 3.A.3.3, 3.A.4.1, 3.A.4.2, 3.A.4.3, 3.B.1.1, 3.B.1.2, 3.B.1.3, 3.B.2.1, 3.C.4.1, 3.C.4.2, 4.A.1.1, 4.A.2.1, 4.A.2.2, 4.A.2.3, 4.A.3.1, 4.A.3.2

**UNIT 3. CIRCULAR MOTION AND GRAVITATION [CR2c]**

1. Uniform circular motion
2. Dynamics of uniform circular motion
3. Universal Law of Gravitation

**Big Ideas 1, 2, 3, 4**

**Learning Objectives:** 1.C.3.1, 2.B.1.1, 2.B.2.1, 2.B.2.2, 3.A.3.1, 3.A.3.3, 3.B.1.2, 3.B.1.3, 3.B.2.1, 3.C.1.1, 3.C.1.2, 3.C.2.1, 3.C.2.2, 3.G.1.1, 4.A.2.2

**UNIT 4. ENERGY [CR2f]**

1. Work
2. Power
3. Kinetic energy
4. Potential energy: gravitational and elastic
5. Conservation of energy

**Big Ideas 3, 4, 5**

**Learning Objectives:** 3.E.1.1, 3.E.1.2, 3.E.1.3, 3.E.1.4, 4.C.1.1, 4.C.1.2, 4.C.2.1, 4.C.2.2, 5.A.2.1, 5.B.1.1, 5.B.1.2, 5.B.2.1, 5.B.3.1, 5.B.3.2, 5.B.3.3, 5.B.4.1, 5.B.4.2, 5.B.5.1, 5.B.5.2, 5.B.5.3, 5.B.5.4, 5.B.5.5, 5.D.1.1, 5.D.1.2, 5.D.1.3, 5.D.1.4, 5.D.1.5, 5.D.2.1, 5.D.2.3

**UNIT 5. MOMENTUM [CR2e]**

1. Impulse
2. Momentum
3. Conservation of momentum
4. Elastic and inelastic collisions

**Big Ideas 3, 4, 5**

**Learning Objectives:** 3.D.1.1, 3.D.2.1, 3.D.2.2, 3.D.2.3, 3.D.2.4, 4.B.1.1, 4.B.1.2, 4.B.2.1, 4.B.2.2, 5.A.2.1, 5.D.1.1, 5.D.1.2, 5.D.1.3, 5.D.1.4, 5.D.1.5, 5.D.2.1, 5.D.2.2, 5.D.2.3, 5.D.2.4 , 5.D.2.5, 5.D.3.1

**UNIT 6. SIMPLE HARMONIC MOTION [CR2d]**

1. Linear restoring forces and simple harmonic motion
2. Simple harmonic motion graphs
3. Simple pendulum
4. Mass-spring systems

**Big Ideas 3, 5**

CR2c— The course design provides opportunities for students to develop understanding of the foundational principles of gravitation and circular motion in the context of the big ideas that organize the curriculum framework.

CR2f— The course design provides opportunities for students to develop understanding of the foundational principle of energy in the context of the big ideas that organize the curriculum framework.

CR2e— The course design provides opportunities for students to develop understanding of the foundational principles of linear momentum in the context of the big ideas that organize the curriculum framework.

CR2d— The course design provides opportunities for students to develop understanding of the foundational principles of simple harmonic motion in the context of the big ideas that organize the curriculum framework.2

**Learning Objectives:** 3.B.3.1, 3.B.3.2, 3.B.3.3, 3.B.3.4, 5.B.2.1, 5.B.3.1, 5.B.3.2, 5.B.3.3, 5.B.4.1, 5.B.4.2

**UNIT 7. ROTATIONAL MOTION [CR2g]**

1. Torque
2. Center of mass
3. Rotational kinematics
4. Rotational dynamics and rotational inertia
5. Rotational energy
6. Angular momentum
7. Conservation of angular momentum

**Big Ideas 3, 4, 5**

**Learning Objectives:** 3.F.1.1, 3.F.1.2, 3.F.1.3, 3.F.1.4, 3.F.1.5, 3.F.2.1, 3.F.2.2, 3.F.3.1, 3.F.3.2, 3.F.3.3, 4.A.1.1**,** 4.D.1.1, 4.D.1.2, 4.D.2.1, 4.D.2.2, 4.D.3.1, 4.D.3.2, 5.E.1.1, 5.E.1.2, 5.E.2.1

**UNIT 8. MECHANICAL WAVES [CR2j]**

1. Traveling waves
2. Wave characteristics
3. Sound
4. Superposition
5. Standing waves on a string
6. Standing sound waves

**Big Idea 6**

**Learning Objectives:** 6.A.1.1, 6.A.1.2, 6.A.1.3, 6.A.2.1, 6.A.3.1, 6.A.4.1, 6.B.1.1, 6.B.2.1, 6.B.4.1, 6.B.5.1, 6.D.1.1, 6.D.1.2, 6.D.1.3, 6.D.2.1, 6.D.3.1, 6.D.3.2, 6.D.3.3, 6.D.3.4, 6.D.4.1, 6.D.4.2, 6.D.5.1

**UNIT 9. ELECTROSTATICS [CR2h]**

1. Electric charge and conservation of charge
2. Electric force: Coulomb’s Law

**Big Ideas 1, 3, 5**

**Learning Objectives:** 1.B.1.1, 1.B.1.2, 1.B.2.1, 1.B.3.1, 3.C.2.1, 3.C.2.2, 5.A.2.1

**UNIT 10. DC CIRCUITS [CR2i]**

1. Electric resistance
2. Ohm’s Law
3. DC circuits
4. Series and parallel connections
5. Kirchhoff’s Laws

**Big Ideas 1, 5**

**Learning Objectives:** 1.B.1.1, 1.B.1.2, 1.E.2.1, 5.B.9.1, 5.B.9.2, 5.B.9.3, 5.C.3.1, 5.C.3.2, 5.C.3.3

CR2g— The course design provides opportunities for students to develop understanding of the foundational principles of rotational motion in the context of the big ideas that organize the curriculum framework.

CR2j— The course design provides opportunities for students to develop understanding of the foundational principles of mechanical waves in the context of the big ideas that organize the curriculum framework.

CR2h— The course design provides opportunities for students to develop understanding of the foundational principles of electrostatics in the context of the big ideas that organize the curriculum framework.

CR2i— The course design provides opportunities for students to develop understanding of the foundational principles of electric circuits in the context of the big ideas that organize the curriculum framework.3

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#### POLICIES AND PROCEDURES

**Classroom Rules & Procedures**:

EXPECTATION SHEET

Class Safety: AP Physics, as all science courses at Webb, is experimentally based. We will be doing science and will, therefore, be working with delicate equipment, high voltages, and tempting toys. If you follow instructions, work carefully, and use common sense, there will be no danger. Horseplay, foolish behavior, or unauthorized experiments will lead to your not being allowed in the science lab. If you do want to do further experiments with the lab or the demonstration equipment or some totally new experiment not covered in the curriculum, check with me. Almost always something can be worked

out under supervision.

Attendance Policy: Attendance and active participation in the laboratory is vital to success in this course. You are expected in class at your seat with materials at the beginning of the period; otherwise you are late. If you are late, bring a note. Every day in science is important. If you are absent, for whatever reason, you will be expected to make up all work. Many absences you will know about beforehand (for example: field trips and away games.) It will be up to you to let

me know as far ahead as possible when you will be missing and how you plan to make up the missed work. In most cases, schedule permitting, you will be expected to make up the work during a free period or after school..

**Grading Policies and Grading Scale:**

 Evaluations (Grading):

TESTS (45%): Tests are administered at the end of each major unit, roughly every 34 weeks with a great deal of advance notice. Makeup

tests will be administered as soon as possible after returning to class. The time and place of the make up test will be made with the instructor by appointment. Tests will be kept on file for reference.QUIZZES (20%): 12Quizzes are given very frequently (as often a three times in a week), and are never announced. They are given at the beginning of 1212class and their time allotment is strictly limited. The quiz is very often a homework problem from the most recent homework assignment or an example problem from a previous class discussion. These quizzes are never made up. If a student misses a quiz because of unexcused absence or tardy, they will receive a zero. If the absence or tardy is excused,

the quiz will not be12 averaged into their grade. LABS (15%): Lab reports are due after each lab exercise. If the student is legally absent from a lab exercise, it will be made up on their time within the next three class days (generally either before or after school). If they are present for a lab but absent ("excused") on the day the writeup is due, the writeup must be handed in on the day of

return. If they are absent ("unexcused") on the day the report is due the grade will be AP PHYSICS –1. lowered accordingly. All laboratory reports must follow the outline provided in the handout titled "Writing a Lab Report". Reports will be incorporated in the student’s portfolio after grading. HOMEWORK (20%): will be maintained in a student portfolio that will be collected the day of a unit test. This will consist of class notes, worksheets, homework problems from the book, and various readings (see next section). Homework is an internal part of the

learning process. They must be complete, neat, and worked out as far as possible. Because homework is a learning and growth process, correct answers are not always expected, and full credit will always be given for timely, full efforts.

Readings/Reflections: During the year short selections from various print sources

including the textbook will be assigned. The students will be expected to reflect on these readings. The reflections will elaborate on the impact the author had on their understanding of the topic covered, how it integrated into previous knowledge, and what additional thoughts it may have spawned. These readings will be turned in with other homework on the day of the unit test. Semester and

Final Exams

Exams will be given on the final days of the marking periods. They will count 20%

toward the semester grade and will be a cumulative. The final exam will take the form of a yearend project. The project will challenge students in all competency areas. The final project will be fully explained at the beginning of the second semester.

**Grading:** Grades will be based on a weighted percentage of points possible. The student handbook contains the same scale.

 A+ 97-100 B+ 87-89 C+ 77-79 D+ 67-69

 A 93-96 B 83-86 C 73-76 D 63-66

 A- 90-92 B- 80-82 C- 70-72 D- 60-62 Failing below 60

**Remember the Falcon Way: accountability, discipline, excellence, integrity, professionalism, respect, and responsibility.**

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#### CONTACT INFORMATION

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

Parent Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_

Parent Email address\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Student Computer access \_\_\_\_\_\_\_\_\_\_\_Yes \_\_\_\_\_\_\_\_\_\_\_\_No