



## SAMPLE SYLLABUS #2

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# AP<sup>®</sup> Physics C: Mechanics

## Curricular Requirements

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<b>CR1</b>	Students and teachers have access to college-level resources, including a college-level textbook and reference materials in print or electronic format.	<i>See page:</i> 2
<b>CR2</b>	The course provides opportunities to develop student understanding of the required content outlined in each of the units described in the AP Physics C: Mechanics Course and Exam Description.	<i>See page:</i> 2
<b>CR3</b>	The course provides opportunities for students to develop the skills related to Science Practice 1: Creating Representations.	<i>See page:</i> 2
<b>CR4</b>	The course provides opportunities for students to develop the skills related to Science Practice 2: Mathematical Routines.	<i>See page:</i> 2
<b>CR5</b>	The course provides opportunities for students to develop the skills related to Science Practice 3: Scientific Questioning & Argumentation.	<i>See page:</i> 2
<b>CR6</b>	Students spend a minimum of 25% of instructional time engaged in hands-on laboratory investigations.	<i>See page:</i> 3
<b>CR7</b>	Students engage in hands-on laboratory investigations representative of the topics outlined in the AP Physics C: Mechanics Course and Exam Description.	<i>See page:</i> 3
<b>CR8</b>	The course provides opportunities for students to record evidence of their scientific investigations in a portfolio of lab reports or a lab notebook (print or digital format).	<i>See page:</i> 3

# Advanced Placement Physics C: Mechanics Sample Syllabus #2

Textbook provided on the AP Course Audit form. **CR1**

## \*Topics Covered

All the content in the current AP<sup>®</sup> Physics C: Mechanics Course and Exam Description will be covered in this course. **CR2**

Unit 1: Kinematics (1D and 2D motion)

Unit 2: Forces (Newton's Laws, FBDs, circular motion, gravitation and orbits)

Unit 3: Conservation Laws (work, energy, power, conservation of energy, impulse, momentum and conservation of momentum)

Unit 4: Rotation (rotational kinematics, rotational dynamics, torque, rotational energy, angular momentum, conservation of angular momentum)

Unit 5: Oscillations (simple harmonic motion, pendulums, masses on springs)

**\*This course will incorporate the Science Practices 1, 2, and 3 into the curriculum within each unit. Here are some examples of how that is happening:**

### Science Practice 1 **CR3**

During the kinematics unit, students will be asked to sketch position vs. time, velocity vs. time, and acceleration vs. time for a variety of situations.

### Science Practice 2 **CR4**

During the forces unit, student will be asked to calculate the accelerations for a variety of situations, including objects on flat surfaces, objects on inclines, and connected systems.

### Science Practice 3 **CR5**

During the oscillations unit, students will design an experiment to determine what factors affect the period of a pendulum. They will present their findings and will have to come to a consensus as a class through discussion and argumentation.

### **CR2**

The syllabus must include an outline of course content by unit title to demonstrate the inclusion of the required course content listed in the current AP Physics C: Mechanics Course and Exam Description.

### **CR3**

The syllabus must include a section labeled "Science Practice 1" describing one assignment, activity, or lab where students create representations that depict physical phenomena.

### **CR4**

The syllabus must include a section labeled "Science Practice 2" describing one assignment, activity, or lab where students use mathematical routines.

### **CR5**

The syllabus must include a section labeled "Science Practice 3" describing one assignment, activity, or lab where students design experimental procedures, and make and justify claims.

\*Students in this course will spend a minimum of 25% of the instructional time on hands-on, mostly inquiry-based labs. **CR6** Students are required to maintain a lab notebook for each lab. **CR8** The following labs will be done: **CR7**

1. Constant Velocity Lab – Students design a lab to show an object moves with constant velocity.
2. Constant Acceleration Lab – Students design a lab to show an object moves with constant acceleration.
3. Predict the Projectile Lab – Students predict the landing site of a ball when launched from the top of a lab table at a given angle.
4. Friction Lab – Students design a lab to determine the coefficient of friction between a book and the lab table using only a ruler and stopwatch.
5. Atwood's Machine Lab – Students determine the relationship between total mass and acceleration and the mass difference and acceleration.
6. Flying Cow Lab – Students design a lab to determine the velocity of the flying cow using only a ruler and stopwatch.
7. Impulse Lab – Using video analysis, students determine the impulse of 2 people who are pushing off each other on carts.
8. 1D Collisions Lab – Students design a lab using carts and a track to determine if momentum is conserved and to identify if a collision is elastic or inelastic.
9. 2D Collisions Lab – Students design a lab to determine if momentum is conserved in 2D using hover disks.
10. Rotational PVC Lab – Students design a lab to determine the moment of inertia ( $I$ ) of a PVC structure. They then have to compare it to a calculated value.
11. Toilet Paper Lab – Students predict where to place an unrolling roll of toilet paper so that it hits the ground at the same time a roll of toilet paper is dropped from 2 meters. Students must use forces and torques.
12. Conservation of Angular Momentum Lab – Students design a lab to determine if angular momentum is conserved when various objects are dropped onto a spinning disk.
13. Popper Lab – Students determine the spring constant of a popper toy.
14. Pendulum Lab – Students design a lab to determine which variables affect the period of a pendulum.
15. Beats Lab – Students design a lab to construct a mass on a spring and a pendulum that have a period made to match the beat of a song.

**CR6**

The syllabus must include an explicit statement that at least 25% of instructional time is spent engaged in hands-on laboratory investigations, with an emphasis on inquiry-based labs.

**CR8**

The syllabus must include an explicit statement that students are required to maintain a lab notebook or portfolio (hard copy or electronic) that includes all their lab reports.

**CR7**

The syllabus must include a title and brief description for each laboratory investigation. The labs listed should be representative of the topics outlined in the AP Physics C: Mechanics Course and Exam Description.