SAMPLE SYLLABUS #1

AP® Physics C: Mechanics

Curricular Requirements

CR1	Students and teachers have access to college-level resources, including a college-level textbook and reference materials in print or electronic format.	*See page:* 2
CR2	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.	*See page:* 2
CR3	The course provides opportunities for students to develop the skills related to Science Practice 1: Creating Representations.	*See page:* 2
CR4	The course provides opportunities for students to develop the skills related to Science Practice 2: Mathematical Routines.	*See page:* 2
CR5	The course provides opportunities for students to develop the skills related to Science Practice 3: Scientific Questioning & Argumentation.	*See page:* 2
CR6	Students spend a minimum of 25% of instructional time engaged in hands-on laboratory investigations.	*See page:* 2
CR7	Students engage in hands-on laboratory investigations representative of the topics outlined in the AP Physics C: Mechanics Course and Exam Description.	*See page:* 3
CR8	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).	*See page:* 2

Advanced Placement Physics C: Mechanics Sample Syllabus #1

Textbook provided on the AP Course Audit form. CR1

Course Content

The course will follow units as listed in the AP® Physics C: Mechanics Course Exam Description. CR2

Unit 1: Kinematics

Unit 2: Force and Translational Dynamics

Unit 3: Work, Energy, and Power

Unit 4: Linear Momentum

Unit 5: Torque and Rotational Dynamics

Unit 6: Energy and Momentum of Rotating Systems

Unit 7: Oscillations

Science Practice 1 CR3

Toy Wind-up Truck: Students determine the relationship between the x-t, v-t, and a-t for a toy wind-up truck. Students draw a motion map and also make an appropriate velocity-time graph and acceleration-time graph based on the position-time graph.

Science Practice 2 CR4

Atwood Machine: Students will determine the relationship between acceleration and total mass as well was acceleration and mass difference. Students will measure the time for the masses to fall and will use kinematic equations to calculate the acceleration. Students will graph the acceleration and total mass, as well as acceleration and mass difference. Students must linearize the graph of acceleration and mass difference then write an equation based on the best fit lines of the graphs.

Science Practice 3 CR5

Period of a Pendulum: Given the question, "What factors affect the period of a pendulum?" students must identify measurable variables, design an experiment to test each of those variables, collect data, and graph the data to determine if there is a relationship and what that relationship is. Student will then make a claim of the factors that affect the period using evidence from experimental data.

Hands-on Laboratory Investigations

At least 25% of instructional time is spent engaged in hands-on laboratory investigations, with an emphasis on inquiry-based labs. CR6 All students will keep a lab notebook for all lab work. CR8 This notebook is provided by the instructor.

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.

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

Unit 1: Kinematics

- Toy Truck Lab: Determine the relationship between the position and time of a toy pull-back spring-loaded car.
- Projectile Challenge: Students must land a projectile launched from a lab table and have it "caught" in a constant velocity buggy.

Unit 2: Force and Translational Dynamics

- Atwood Machine Lab: Students determine the relationship between the total mass and the acceleration, and the relationship between the mass difference and the acceleration.
- Flying Penny: Using a meter stick rotating on a pencil, students determine the coefficient of static friction between a penny and a meter stick. Students then design an additional experiment to verify their results.
- When Pigs Fly: Students design a lab to determine the velocity of the flying pig using only a ruler and a stopwatch.
- Universal Gravitation: Using the PhET simulator, "Gravity Force Lab," students determine the relationship between the force between two massive objects and the distance between them.

Unit 3: Work, Energy, and Power

- Energy of a Smart Cart: Students determine if energy is conserved through various types of collisions of smart carts.
- FOUR! Energy Dissipation Lab: Students determine the relationship between the total mechanical energy and time of a bouncing golf ball.

Unit 4: Linear Momentum

- Conservation of Linear Momentum: Students verify that momentum is conserved in elastic and inelastic collisions.
- Soccer Puck Collision: Using video analysis, students show that momentum is conserved in two-dimensional motion through a glancing collision of air-pucks.
- Impulse Momentum: Experimentally verify the impulse momentum theorem with a collision of a smart cart and a force sensor.

Unit 5: Torque and Rotational Dynamics

- Spinny T Lab: Students determine the relationship between the torque applied and the acceleration of the spinny T. The rotational inertia of the spinny T is then directly calculated.

Unit 6: Energy and Momentum of Rotating Systems

- TP Challenge: Students predict from what height to drop an unrolling roll of toilet paper so that it hits the ground at the same time as a roll of toilet paper dropped from 2 meters.

Unit 7: Oscillations

- Pendulum and Spring Lab: Students design a lab to determine which variables affect the period of a pendulum and the period of a spring.
- Swinging to the Beat Lab Challenge: Students design a lab to make a pendulum swing to the beat of a song.

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.