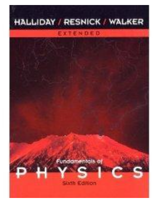
Course Requirements and Syllabus AP Exam Date: Monday, May 14th, 2012 12:00P
Session

Course Description – AP Physics C: Mechanics

The AP Physics C course is a challenging class that closely follows the syllabus designed by the College Board which prepares students to take the AP Physics C: Mechanics exam. As the course utilizes differential and integral calculus where appropriate throughout, about half of the students in take Calculus concurrently (most in AB Calculus), the other half have taken Calculus in junior year (most are in BC Calculus). This course is intensive and requires the students' dedication and focus both in and out of class.

Textbooks:

ISBN#:	Publisher:	Author(s)	Date
0471332364	John Wiley & Sons	Halladay & Resnick	2001
0130611433	Prentice Hall	Giancoli	



Schedule
The class meets five days during a 2-week AB cycle for 84 minutes for both Fall (Mechanics) and Spring (E&M) semesters. This schedule provides a measure of flexibility to perform experiments or have extended problem solving sessions. In a typical week, 55-80 minutes will be dedicated to lab activities with the rest of the time devoted to class discussion, problem solving strategies and practice with solving problems, and assessment.

Grading:

Student grades will be based on specific learning expectations for each unit. Student work and contributions will be assessed using both formative (non-graded) and summative feedback (graded). The course grade will be based on the summative feedback only and may include unit assessments, lab assessments, and research projects.

Course Outline: The course will cover the following topics. Approximate length of time that will be allotted to the topics is given in parenthesis. Short summative assessment will be given during a 5 class session cycle. Approximately, 4 comprehensive summative assessments will be administered throughout the semester in addition to an end of semester examination.

- Kinematics (3 weeks)
    - Vectors
    - 1-Dimensional Kinematics
    - Projectiles
    - Uniform/Nonuniform Circular Motion
    - Relative Motion

- Newton's Laws of Motion and Classical Mechanics (2 weeks)
    - Force and Mass
    - Tension and Normal Reaction
    - Uniform Circular Motion
    - Friction
    - Drag Force

- Work, Energy, and Power (1 week)
    - Work
    - Energy
    - Kinetic and Potential Energies
    - Conservation of Mechanical Energy
    - Work done by Conservative and Nonconservative Forces
    - Work done by position-dependent forces
    - Power

- Linear Momentum (2 weeks)
    - Impulse and Linear Momentum
    - Law of Conservation of Linear Momentum
    - Two-Body Collisions in 1-D and 2-D
    - Center of Mass and Systems of Particles

- Oscillations (2 weeks)
    - Simple Harmonic Oscillations
    - Kinematics & Dynamics of Oscillations
    - Simple Pendulum
    - Damped Oscillations (time permitting)

- Rotational Kinematics (2 weeks)
    - Constant Angular Speed
    - Constant Angular Acceleration
    - Relationships between Linear and Angular Variables

- Rotational Dynamics, Energy, and Work (2 weeks)
    - Rigid Bodies
    - Moment of Inertia and Torque
    - Newton's Second Law applied to rotating systems
    - Angular Momentum
    - Conservation of Angular Momentum and Rotational Energy
    - Rotational Equilibrium
    - Mechanical Equilibrium
    - Rotational/Rolling Motion

- Gravitation (2 weeks)
    - Newton's Law of Gravitation
    - Gravitational Potential Energy
    - Motion of Planets and Satellites
    - Kepler's Laws
    - Escape Velocity

Possible Lab Experiments: As mentioned previously, 20-30% of the time in class is devoted to application and exploration of physics concepts through practical laboratory work. Students are expected to perform the experiments with care and attention to the physics concepts (new concepts and concepts being reinforced), experimental uncertainties that are inherent to the system, assumptions that are made regarding the system, analysis of data, and safety. Labs are designed to encourage critical thinking by asking the student to consider the underlying concepts inherent in experimental work, not simply collecting data using a directed laboratory approach. Students may be asked to submit written analysis of the experiment in which they are expected to discuss the ideas noted above (experimental uncertainties, assumptions, etc.). All students are required to maintain a notebook that chronicles their lab activities, data, observations, and conclusions. Labs are designed to connect prior knowledge to the new concepts being studied and develop physical models of the phenomena studied. This connection requires students to focus their attention on reforming misconceptions and clearly articulating a detailed understanding of the concept, not just doing well on the summative assessments.

Labs are chosen to enhance the students' learning and reinforce concepts that need it. Therefore, experiments will be designed with attention to this. Possible experiments that students may perform include the following:

Velocity as a Function of Time and Distance (Constant Acceleration)
Uniformly Accelerated Motion on Pasco® track
Launch Ball into cup
Free Fall
Centripetal Acceleration of an Object in Circular Motion
The Ballistic Pendulum and Projectile Motion

Newton's Second Law
Atwood's Machine/Modified Atwood's Machine
Coefficient of Static/Kinetic Friction
Elastic Forces/Hooke's Law
Air Resistance Model
Force Table and Vector Addition of Forces

Work-Energy Theorem
Conservation of Energy - Spring-Mass System
Conservation of Energy - Pendulum
Conservation of Energy - Inclined or Level Plane ("Frictionless" and with friction)

Impulse and Conservation of Momentum
Conservation of Momentum on the Pasco® track

Simple Harmonic Motion of a Spring-Mass System
Position-Time Graph of a Pendulum
Simple Harmonic Motion - The Simple Pendulum
Simple Harmonic Motion - Mass on a Spring (and 2 Springs)

Physical Pendulum
Angular Acceleration and Moment of Inertia
Torque, Inertia, and Mechanical Energy of Rotating Systems
Torques and Rotational Equilibrium of a Rigid Body
Conservation of Angular Momentum