



# BOSTON LATIN SCHOOL

Department of Science

2014-2015

**COURSE** Advanced Placement Physics: Mechanics

**TEACHER**

Room:

School phone: 617-635-8895

E-mail:

**CLASSROOM** 336

## COURSE DESCRIPTION

Advanced Placement Physics: Mechanics course follows a syllabus established by the College Board, based on a college introductory course in Calculus-based mechanics, usually taken by physics majors in their first semester. Topics covered include kinetics, Newton's laws, rotation, energy, momentum, gravitation and oscillations. The course is available as an elective to students in their junior or senior years who have successfully completed Physics I. This is a yearlong laboratory course.

**READING SYLLABUS:** *Fundamentals of Physics* by Halliday, Resnick & Walker, Volume 1, 9th Edition.

## ESSENTIAL QUESTIONS

- How can we use calculus to model position, velocity and acceleration?
- How can we track motion in 2 or 3 dimensions?
- Can we use Newton's laws as a complete system for modeling a systems dynamics?
- Can objects have constant speed but accelerate?
- How are oscillations and circular motions similarly modeled?
- What is conserved and not conserved in collisions?
- What keeps planets and moons in orbit?

## POWER STANDARDS

- Understand and manipulate equations for position, velocity and acceleration.
- Use vectors to describe motion and forces in multiple dimensions
- Apply Newton's Three Laws to analyze forces and motion for individual objects and systems of interacting objects
- Apply the Work-Energy theorem to analyze systems of one or more objects, with or without the use of potential energy functions.
- Differentiate between conservative and non-conservative forces, and derive potential energy functions.
- Analyze collisions and other systems of particles using concepts of center of mass, linear momentum and elasticity.
- Analyze objects in circular motion as well as objects rotating, using concepts of torque, rotational inertia, and angular momentum.
- Determine the period and equations of motions for oscillating objects (mass-on-spring, pendula) and orbiting objects.

## 21<sup>st</sup> CENTURY LEARNING EXPECTATIONS

- **4 C's** ([www.p21.org](http://www.p21.org))
  - **Communication:** Sharing thoughts, questions, ideas, and solutions in *writing and verbally* while considering the ideas of others.
  - **Collaboration** - Working together to reach a goal - putting talent, expertise and smarts to work.
  - **Critical Thinking** -
    - Looking at problems in a new way, linking learning across subjects and disciplines.
    - Evaluating outside resources while synthesizing research with personal observations.
  - **Creativity** - Trying new approaches to get things done equals innovation and invention.
- **Integrate Technology** - Utilize web resources and Google Docs for individual and group assignments.

### RESOURCES:

- [sis.mybps.org](http://sis.mybps.org): course gradebook and a day to day calendar of assignments.
- [webassign.net](http://webassign.net): online homework problems from our textbook
- [classroom.google.com](http://classroom.google.com): Assignments, Google Doc integration, online resources
- other web resources to be shared.

### GRADING:

- **4-3-2-1 System:** Assessment in AP physics will be similar to the introductory physics course at BLS. However, the overall categories have been adjusted to **Understanding, Homework, Lab Performance, Effort and Participation**. All assessed assignments will be scored on a 4 (Excellent), 3 (Good), 2 (Progressing), and 1 (Poor) scale. The grading form will clarify this more.
- **No Averages:** The categories are not averaged to determine a grade, but test scores are more heavily weighted than the introductory course since we are preparing for a strong test performance.
- **Students Propose Grades:** Students propose grades using assessment data to support their proposal. Instructor will review the proposal and record, and assign an appropriate grade.

### HOMEWORK:

Homework is a critical and required component of success in AP Physics. There will be nightly assignments which will require 40 minutes to an hour of focused concentration, rereading of the book and notes, and persistence to figure out tough problems. A serious and documented attempt of every problem is expected, and followup later will often be required. Late unexcused homework may or may not be accepted, depending on the assignment. If accepted it can receive no more than half credit. Larger assignments (labs, vacation practice assignments) may be accepted at the discretion of the instructor, for reduced credit. If a student wants to make up work, they should discuss a plan with the instructor.

### EXPECTATIONS:

...of students:

- Arrive to class **on-time** with all required materials (see below) every day.
- Active involvement, sharing your ideas
- Be respectful but critical of others' ideas
- Be honest
- Follow BLS rules and regs
- Keep room clean
- Abide by the student safety contract
- Try your best

...of the teacher:

- Coordinate investigations and the development of ideas.
- Will work to organize the valuable class time, responding to questions at the appropriate times.
- Provide timely feedback
- Maintain safe, quality learning environment
- Enforce BLS rules and regs

**WHAT YOU NEED?** Students need the following materials for each class period.

- Book Cover for your textbook
- Course Binder (1" to 2" three ring binder) with **Four Sections:**
  - I. Class Notes and Handouts,
  - II: Homework Assignments,
  - III: Tests and Quizzes,
  - IV: AP Practice tests.
- Two Sharpened Pencils
- Blue Pen
- Ruler
- Dry Erase Marker (Be sure to buy new ones through the year).
- Whiteboard Eraser (i.e. Old Sock)
- Calculator (graphing is preferred)

**OFFICE HOURS:** Tuesdays and Thursdays from 2:30-3:30 or by appointment (available most days after school).  
Let me know you're coming by stopping by after class or sending an email.

### **TIPS FOR SUCCESS**

- Be Active!
- Take the time to organize your efforts.
- Don't wait! Get help in class. Don't allow us to move on if you need help.
- Keep up with assignments.
- Share your ideas.
- Get a study buddy.
- Accept a little confusion - you are learning something new!