**AP Physics Syllabus**

**Physics II (1366) – AP-C Mechanics**

**Course Description:**

The AP® Physics C is a national calculus-based course in physics. This course is equivalent to the pre- engineering introductory physics course for the university students. The course utilizes guided inquiry and student-centered learning to foster the development of critical thinking skills. The emphasis is on understanding of the concepts and skills and using the concepts and equations to solve problems. Laboratory work is an integral part of this course. You will spend a minimum of 20 percent instructional time engaged in laboratory work. Each student keep a record of lab reports. As this course is a second-year physics course, it will allow you to deepen your understanding and be able to pick out familiar concepts from more complicated (and realistic) situations.

Much of the teaching you will do for yourself and for each other. I will provide you with some introduction and background. Then I will assign to you a task, problem, or question (perhaps more than one at a time). You will work individually or in groups, often with hands-on equipment and materials, to complete the task. Often, you will be asked to present your solutions to the class and/or to critique or verify the solutions of others. My hope is that you will see that there can be more than one way to solve the same problem.

**Instructor:**

Mr. John Nicholson Room: 294SB

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School Website: <http://ahhs.ahisd.net/cms/One.aspx?portalId=8287&pageId=156915>

Class Website: [http://coachnicholson2007.weebly.com](coachnicholson2007.weebly.com)

**Texts:** (We WILL use the textbook!)

*Physics for Scientists and Engineers* (9th ed.) by Serway and Jewett

Supplementary materials that will be taken from:

* *Fundamentals of Physics* (10th Ed.) by Halliday, Resnick, & Walker
* *Physics – Principles with Applications* (5 Ed.) by Giancoli

**Attendance and Participation:**

The school-wide policy for attendance will be followed. No work may be made up for unexcused absences (including tests!). If you know you will be absent, talk to the teacher during class BEFORE your absence. If you are absent on the day before a test or quiz, you may still be required to take it upon teacher discretion. If you are absent on the day homework is due, it is your responsibility to turn it in or get it checked the next day you are back. If homework is assigned on the day you are absent, you have one day to make it up. Please be active participants in learning. Anyone not cooperating with their group on activities or labs will be penalized points on the assignment.

**Evaluation & Course Grade:**

The grade in this course will be based primarily on objective criteria; i.e., homework, labs, quizzes, and tests. In addition, major and minor projects will be assigned; these can consist of oral/written reports and mechanical constructions. Subjective areas, such as logical procedure in problem solving, presentation and quality of work, lab technique, etc., will be considered as secondary criteria.

Course grades will be determined by the following algorithm:

1. **Nine Weeks Grade**:

a. Homework/Quizzes 25%

c. Lab Activities and Minor Projects 25%

d. Major Grades 50%

2. **Semester Average:**

a. Average of Nine-week’s grades 80%

b. Semester Exam 20%

**Labs**

Most units of study will begin with a lab experiment designed to answer an objective or question. Other laboratory activities will consist of short exercises utilizing computer simulations or simple activities that will be accompanied by a worksheet. The analysis of most labs will be done by hand, but formal lab reports will be typed. Because some universities require proof of college-level labs, it is important that you keep an ungraded copy of formal labs. I also suggest writing a short description of labs done or making a copy of worksheet labs or prior to turning them in (ungraded) to keep in a portfolio. It will be your responsibility to compile a portfolio of your lab reports should your university of choice require proof of laboratory work.

**Daily Grades**

Homework problems are assigned with each unit of study from the associated chapter **in the text**. These selected problems will be supplemented by additional problems derived from previous AP-Physics Exams and other college level texts. Outlines with daily schedules will be handed out at the beginning of each unit including a specific calendar of assignments and due dates. Problem sets are normally due the day after they are assigned unless otherwise stated. The problem sets will usually not be graded, but will be checked for completion (see quiz information below, also). Some time is dedicated at the beginning of each class period to discussing problems that the students are having difficulty in working. We do not have time to cover every single problem and every difficulty. Extra individual help will have to be scheduled by the student. Solutions will be posted after homework is returned. As solutions will be posted, late homework will receive only 50% credit.

Short quizzes over lecture materials, reading assignments, lab information, and homework problems should be expected. Quizzes will contain problems similar to those assigned. The quizzes are usually announced at least one class meeting in advance. On some quizzes, but not all, you may be allowed to work with a partner.

**Major Grades**

Exams will be given at the end of each unit. Each test will consists of a multiple-choice question section, typically 10 – 20 questions, covering primarily your conceptual understanding of the topics which have been covered, but also including questions over historical information and important terms discussed during the lecture presentations. Most (if not all) of the multiple-choice questions will be taken from actual AP Exams. A free response section will follow with 2 to 6 problems similar to those illustrated during the lectures and practiced in the homework assignments. Later in the year, many of these free-response questions will be directly from previous AP Exams as they usually contain multiple subjects combined into a single question. Exams may not be made up if you fail, however, once we start with more AP Test questions, one or more bonus questions will be offered as opportunities for extra points. A project will also count as a major grade, but will usually be collaborative work with a partner. Projects will be assigned several days or weeks in advance, and therefore will not be accepted late.

**Tutoring/Extra Help**

I will be available for extra help every day during lunch. Please make an appointment with me if you are struggling and lunchtime doesn’t work for you. It always helps to have a study buddy or work in groups on homework assignments, as long as everyone is doing his/her own work and no copying is involved.

**Topics and Outline of Course:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit** | **Topic** | **Chapters in Text** | **# of Days**  **(approx.)** |
| 1 | **Physics Toolkit** | 1 | 9 |
| SI Units, Dimensional Analysis |
| Uncertainty, Error, Estimation |
| Graphing, Models, Trig Review |
| 2 | **Kinematics: Linear Motion** | 2 | 12 |
| Kinematics Graphs: Position, Velocity, Acceleration |
| Differential Calculus |
| Kinematic Equations with constant and non-constant acceleration |
| Free Fall |
| 3 | **Motion in a Plane** | 3, 4 | 11 |
| Vectors |
| Kinematics in 2 and 3 Dimensions |
| Relative Motion |
| Projectile Motion |
| 4 | **Dynamics: Newton’s Laws** | 5 | 13 |
| Newton’s Laws |
| Free-body Diagrams |
| Friction |
| Atwood’s Machine, Air resistance/Drag |
| 5 | **Circular Motion** | 6,  Part of 10 | 9 |
| Centripetal Acceleration |
| Centripetal Force |
| Kinematics with constant and non-constant acceleration |
| 6 | **Energy** | 7, 8 | 13 |
| Work done by a constant and varying forces |
| Work-Energy Theorem |
| Work done by non-conservative forces |
| Energy Conservation |
| Potential Energy Functions and Graphs |
| 7 | **Momentum** | 9 | 13 |
| Impulse–momentum relationship |
| Conservation of linear momentum |
| Elastic and inelastic collisions |
| Position and velocity of center of mass |
| 8 | **Rotational Motion and Equilibrium** | Part of 10, 11, 12 | 15 |
| Torque and Equilibrium |
| Newton’s Laws for Rotation |
| Moment of Inertia |
| Conservation of Energy |
| Conservation of Angular Momentum |
| 9 | **Simple Harmonic Motion** | 15 | 8 |
| Kinematics of SHM |
| Dynamics of SHM |
| 10 | **Gravitation** | 13 | 9 |
| Newton’s Law of Gravitation |
| Energy and Angular Momentum |
| Kepler’s Laws |