AP/IB PHYSICS B SYLLABUS AND COURSE INFORMATION

Instructor information

Instructor: G. Woods
Room: 40
Extra Help: 7:30-8:00/3:00-3:30/Lunch
Phone: (480) 472-4628

Course Description

Text: Physics 4th edition; Wilson/Buffa, Prentice Hall
Prerequisites: Trigonometry or department consent.
Course Content: A non-calculus approach to the principles of general physics. Includes statics, kinematics, Newton's laws, fluids, energy, thermal dynamics, circular motion, sound, optics, electricity, magnetism, and modern physics with a strong emphasis on problem solving and application. Recommended for pre-professional and suggested for certain other majors. Group laboratory work will be emphasized throughout the semester. It is highly recommended that students get maximum exposure to microcomputer based laboratory equipment for the purpose of collection and analysis of experimental data.

Course Outline

Unit 1 – Kinematics in One Dimension

- Position and displacement
- Velocity
- Acceleration
- Freefall
- Numerical, algebraic, and graphical representations of motion

Unit 2 – Vectors and Kinematics in two dimensions

- Vector and scalar quantities
- Components of vectors
- Vector addition
- Projectile motion

Unit 3 – Dynamics

- Inertia and mass
- Weight and mass
- Static Equilibrium
- Frictional forces
- Applications of Newton's Laws

Unit 4 – Linear Momentum

- Impulse
- Conservation of momentum
- Elastic and inelastic collisions

Unit 5 – Work and Energy

- Definition of work
- Work energy theorem
- Conservation of energy
- Power

Unit 6 - Circular Motion

- Tangential and angular velocities
- Centripetal force and acceleration
- Newton's Law of Gravity
- Orbital Motion

Unit 7 – Electricity

- Electrostatic charging
- Coulomb's Law
- Electric fields
- Electric potential energy
- Electric potential (Voltage)
- Capacitors
- Voltage, current, resistance, and power
- DC circuits (Ohm's Law)

Unit 8 – Magnetism

- Force on a moving charge in a magnetic field
- Force on a current carrying wire in a magnetic field
- Magnetic field due to a current carrying wire.
- Electromagnetic Induction

Unit 9 – Vibrations and Waves

- Simple Harmonic Motion
- Properties of traveling and standing waves
- Doppler effect
- Superposition and interference
- Speed, frequency and wavelength
- Resonance and beats

Unit 10 – Light and Optics

- Properties of light
- Reflection and refraction
- Lenses and Mirrors
- Diffraction

Unit 11 – Modern Physics

- Photons, the photoelectric effect, Compton scattering, x-rays
- Emission and absorption
- Bohr model and energy levels
- Wave particle duality
- Nuclear Reactions
- Mass-energy equivalence

***Unit 12 – Heat, Kinetic Theory, and Thermodynamics**

- Temperature and heat
- Heat transfer and thermal expansion
- Ideal gases and KMT
- PV diagrams
- Heat engines

***Unit 13 – Fluid Mechanics**

- Absolute and gauge pressure
- Fluid pressure and depth
- Buoyancy
- Bernoulli's equation
- Equation of continuity

*In order to provide a learning experience that promotes inquiry, critical thinking, and depth over breadth, some topics in these units may not be covered. Materials will be supplied for students to study these topics individually.

Laboratory Topics – All of the following labs are hands on laboratory experiences in which students are required to manipulate equipment to gather data. Students make extensive use of technology to gather and analyze experimental data. Each lab will require a minimum of 50 minutes to gather and analyze the data. Students must use out of class time to complete the lab report.

Period of a Pendulum
Students develop a mathematical model for the period of a pendulum.
Constant Velocity
Students develop a mathematical model for a vehicle traveling with a constant velocity.

Constant Acceleration
Students develop a mathematical model for a vehicle traveling with a constant acceleration.
Freefall
Students will determine the acceleration of an object in freefall.
Weight
Students will develop a mathematical model to describe the relationship between mass and weight.
Newton's 2nd Law
Students develop a mathematical model to describe the relationship between force and acceleration.
Friction
Students develop a mathematical model to describe the force of friction.
Hooke's Law
Students develop a mathematical model for the force of a spring.
Conservation of Energy
Students verify the conservation of energy.
Conservation of Momentum
Students verify the conservation of momentum
Circular Motion
Students develop a mathematical model for the force on an object in uniform circular motion
Mass on a Spring
Students develop a mathematical model for the position of a mass oscillating on a spring.
Standing Waves
Students develop a mathematical model relating the velocity, wavelength, and frequency of a wave on a string.
Tuning forks
Students determine the frequency of a tuning fork by analyzing a pressure vs. time graph.
Speed of sound lab
Students will experimentally determine the speed of sound using resonating tubes
Light Intensity
Students will develop a mathematical model for the relationship between light intensity and distance.
Lenses
Students develop the mathematical model for the relationship between object distance and image distance.
Ohm's Law
Students will develop the mathematical model for the relationship between voltage, current, and resistance.
Magnetic Force
Students will explore the force on a current carrying wire in a magnetic field.
Photoelectric Effect
Students will develop a mathematical model between the frequency of light incident on a metal and the kinetic energy of the ejected photoelectrons.
Buoyancy
Students will develop a mathematical model for the buoyancy force on an object in a liquid.
Ideal gases
Students will develop a relationship between the pressure and volume of a gas at a constant temperature.

Lab Practicums

- Two Dune Buggies
- Dune Buggy vs. Fan Car
- Projectile Motion
- Fan Car on an Incline
- Stamp an Egg
- Design a Bumper
- Image formation using multiple lenses
- Determining an unknown resistance
- Period of a toy helicopter

Course Evaluation

Homework: 15%
You will be responsible for keeping a complete and accurate notebook of all assigned class work, notes and homework problems. Portions of the notebook or the entire notebook will be collected and graded. A complete and accurate notebook will be crucial to your success in this course. Supplemental homework will also be assigned and graded on a regular basis.

Quizzes: 20%
One or two quizzes will be given each chapter. The quizzes may or may not be announced. Quiz questions will be very similar to the assigned homework.

Tests: 40%
Unit tests will be given after every two to three chapters. They will consist of multiple choice and free response questions.

Labs: 20%
Lab work will be done in small groups in which teamwork will be essential. However, students will be individually responsible for the information covered in the lab. All Labs are inquiry based with a strong emphasis on student driven experimental design. Students are expected to assist in the development of experimental techniques and procedures. Students work cooperatively to collect and analyze data; however every student will be responsible for an individual lab report. Reports will include title, purpose, experimental design, data, analysis, and conclusions. Students will be responsible for keeping a lab notebook containing all of their lab reports. In addition to inquiry based lab experiments students will also perform lab practicums. Lab practicums will require students to apply theory to solve real world practical applications.

Projects: 5%
There will be a project each semester. The students apply physics concepts to design and create a project that will be evaluated using a competitive performance based assessment method. It will require students to find time to work outside of the classroom.

Semester Exam
A cumulative semester exam will be given at the end of the semester. The exam will make up 20% of your final semester grade. In addition the exam will replace your lowest unit test score.

Special Needs:
Every effort will be made to meet the special needs of any student who meets the prerequisites of the course.

Letter Grades:
A - 90 - 100%
B - 80 - 89
C - 70 - 79%
D - 60 - 69%
F - Below 60%

Semester Grade:
1st Quarter 40%
2nd Quarter 40%
Semester Exam 20%

Course Policies

Make up work:
Missed tests, quizzes, or labs due to an excused absence may be made up. If the absence is unexcused no credit will be awarded. As a minimum, the student will have the same number of days to make up the work as were missed during the absence. Late work will not be accepted.

Classroom Guidelines:
1. Respect everyone's right to learn.
2. Respect adults, peers, and property.
3. Come to class prepared.
4. Use appropriate and respectful language in the school environment.
5. Comply with district and school rules.

Consequences (Classroom Guidelines):
1. General warning to student.
2. One on one conference with student.
3. Phone call to parent to inform parent of inappropriate behavior(s)
4. Second phone call to parent.
5. Office referral.

Attendance: Refer to the school attendance policy.

Keys to Success:
- Show all your work in a neat and organized fashion. Careless or sloppy work will not be accepted.
- Excellent attendance is essential to your success.
- Work on your homework every night. Don't wait until the last minute!
- If you don't understand something, ASK! Chances are you are not alone.
- When you finish a problem come back to it later and practice it again.

***The instructor reserves the right to alter items in this syllabus via verbal instructions in class. The student is responsible for taking note of any such changes and acting accordingly.**