AP Physics B

2011-2012
Trimesters (A, B, C, D)

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Purpose/Course Description:

This course introduces students to all of the topics that are covered in a typical first year college physics course. Upon completion of the course, students should be prepared to complete the AP Physics B exam, which may result in physics credit awarded by the student's intended college.

This class is a four trimester class, meeting everyday for 72 minutes. A typical lecture class will involve reinforcement of previous material, the introduction of new material and time provided for students to work together on exercises and activities that reinforce the day's lesson. A major portion of the grade is based upon lab work, which is linked to the course material. Labs are often "open-ended," requiring students to develop sound laboratory skills while applying what they've learned in class. Students should expect at least one lab per unit of study and often two.

Topics, Concepts, or Units of Study:

Trimester 1:

- *Unit One: Math and Data Review*

  A: Data collection and analysis
  B: Vector Addition
  Lab: "Mystery Stick" (Measurement and error analysis)

- *Unit Two: Kinematics*

  A: Motion in One Dimension
  Position vs. Time & Velocity vs. Time Graphs
  Equations of motion under constant acceleration
  Lab: "I Walk the Line"

B: Motion in Two Dimensions
Projectiles
Relative Velocity
Lab: "Fly Ball"

- *Unit Three: Newton's Laws*

A: Static Equilibrium
B: Dynamics of a Single Body
C: Systems of Two or More Bodies
Lab: "Tow, Tow, Tow Your Boat"
D: Universal Gravitation
E: Circular Motion
Lab: "Mystery Mass"

Trimester 2:

- *Unit Four: Work, Energy, Power, and Momentum*

A: Work and Work-Kinetic Energy Theorem
B: Conservative Forces and Potential Energy
C: Conservation of Mechanical Energy
D: Power
Lab: "Soapbox Derby"
E: Simple Harmonic Motion
F: Momentum
Lab: "Dynamics Carts"

- *Unit Five: Fluid Mechanics*

A: Density and Pressure
B: Buoyancy: Archimedes Principle
C: Bernoulli's Equation
D: Fluid Flow
Lab: "Tow Your Boat II"

- *Unit Six: Wave Motion and Sound*

A: Properties of Waves
B: Standing Waves and Harmonics
Lab: "Guitar Tuning 101"
C: Doppler Effect
D: Sound Intensity and Power

- *Unit Seven: Thermal Physics*

A: Temperature and Thermal Effects

B: Kinetic Theory, Ideal Gases and Gas Laws
C: Thermodynamics
D: First Law of Thermodynamics
E: Second Law of Thermodynamics
F: Cyclical Processes and Efficiency
Lab: "Another Boat Race?"

Trimester 3:

- *Unit Eight: Electrostatics*

A: Coulomb's Law
Lab: "Electron Counter"
B: Electric Fields and Guass' Law
C: Electric Potential Energy and Electric Potential
D: Capacitance

- *Unit Nine: Electric Current*

A: Emf, Current, Resistance, and Power
B: DC Circuits
C: Ohm's Law
D: Kirchoff's Laws
Lab: "Design a Circuit"

- *Unit Ten: Electromagnetism*

A: Magnetic Fields and Flux
B: Electromagnetic Induction
C: Magnetostatics
Lab: "Build a Motor"

Trimester 4:

- *Unit Eleven: Optics*

A: Geometric Optics
B: Electromagnetic Spectrum
C: Interference Effects
Lab: "Twinkle Twinkle Little Star"

- *Unit Twelve: Modern Physics*

A: Atomic Physics and Quantum Effects
B: Photons and the Photoelectric Effect
C: Wave Nature of Matter
D: Mass Defect and Nuclear Binding Energy
E: Radioactive Decay

F: Fusion and Fission
G: Mass-Energy Equivalence and Conservation
Lab: "Design a Game"

Textbooks Used and Other Sources:

- *Physics*, Douglas Giancoli; 6th Ed. Updated
  ISBN 0-13-607302-6

Materials Needed (Supplies Suggested):

- Pen/Pencils
- Notebook
- Dedicated Lab Notebook.
- Scientific Calculator

Methods of Instruction:

- Demonstration Investigation
- Hands-on Laboratory Investigation
- Class Lecture & Discussion

Evaluation/Grade Calculations:

- Trimester Grade is determined by (points earned / points possible) x 100
- Final Trimester Grade:
  - Coursework 80%
  - Trimester Exam 20%

Types of Evaluation and Assessment:

(Typical point values included)

- Tests…100 points
- Quizzes…35 points
- Labs…30-100 points
- Homework…35-40 points (typical)

A typical unit will consist of: one test, one quiz, one or two labs, and one cumulative homework grade, although the number of quizzes and labs may vary depending on the material for any given unit. Quizzes and test are structured in the same fashion as the AP Exam and often use multiple choice and open-ended questions from previous AP Exams that have been released.

Graded homework sets as well as some course materials will be administered through the LON-CAPA online course management system. As the elements within the problem sets are randomized and the solutions are unique, students are encouraged to collaborate on these

assignments.

On the following page is a brief description of the labs that will be included in the student's lab notebook. Along with these labs, there will be several smaller activities that will be used to introduce or reinforce various items that are covered in the course.

Lab	Synopsis	Objectives
1: Mystery Stick	Use indirect measurements to determine the mass of a stick.	Units, Conversions, Metric Prefixes, Accuracy, Precision, Uncertainty, Significant Figures
2: I Walk the Line	Students walk along a line in accordance with a set of graphs that they've been given.	Graphing, Linear Motion
3: Fly Ball	Students will determine the initial velocity of a ball.	Acceleration due to Gravity, Projectile Motion, Vectors
4: Tow, Tow, Tow Your Boat	Students will build a simple boat hull that will be towed through a tank by a falling mass	Newton's Laws of Motion, Two Body Systems, Torque
5: Mystery Mass	Use centripetal force to determine the mass of an unknown object.	Centripetal Acceleration, Centripetal Force, Two Body Systems
6: Soapbox Derby	Students build model cars that race down a ramp.	Work, Potential, Kinetic, and Conservation of Mechanical Energy, Rotational Dynamics, Linear Motion, Inclined Surfaces, Friction
7: Dynamics Carts	Students will make predictions about the final velocities of various objects after a collision	Kinetic Energy, Momentum, Impulse, Conservation of Momentum
8: Tow Your Boat II	Students will move their boat down the tank with a minimum amount of work.	Density, Pressure, Buoyancy, Fluid Flow, Work, Kinetic Energy
9: Guitar Tuning	Students will use the properties of standing waves to tune a guitar.	Standing Waves, Harmonics, Wave Interference, Beating
10: Another Boat Race?	Students construct and test steam powered "pop-pop" boats.	Temperature, Kinetic Theory, 1st Law and 2nd Law of Thermodynamics, Cyclical Processes, Efficiency
11: Electron Counter	Students estimate the number of surplus or deficit electrons on a charged object	Electron Charge, Coulombs Law, Newton'
12: Design a Circuit	Students will design, and build circuits that meet given criteria.	Ohm's Law, Kirchoff's Laws, Power
13: Build a Motor	Students will construct a simple electric motor.	Electromagnetism, Magnetic Fields
12: Twinkle, Twinkle, Little Star	Students will examine the properties and functions of various parts of a reflecting telescope.	Law of Reflections, Snell's Law, Geometric Optics, Electromagnetic Spectrum

13: Shall We Play a Game?	Students will design a game or demonstration to depict the properties of a specific modern physics topic.	Fission, Fusion, Radioactive Decay, Mass-Energy Equivalence, Photoelectric Effect,

Grading Scale:

93-100	A		73-76	C
90-92	A-		70-72	C-
87-89	B+		67-69	D+
83-86	B		63-66	D
80-82	B-		60-62	D-
77-79	C+		0-59	F

Assignment Expectations:

- Assignments are expected to be completed upon entering the classroom on the day that they are due. Late work for individual assignments is not accepted.

- Group Lab assignment grades that carry over multiple class periods will be prorated accordingly for students who receive unexcused absences during the pre-assigned lab dates. For example, a student who is absent unexcused for 2 out of three lab days will receive a maximum of 33% on that lab activity.

- Students will maintain a lab notebook in which they will complete all of their lab reports. This lab book may be reviewed by the college through which credit is sought as proof of sufficient lab work.

Late Assignments:

- Lab activities are the only assignments that may be turned in late. They receive a 50% penalty for each day that they are late.

- Quizzes and Tests that are missed due to excused absences may be made up on the following Tuesday before or after school. Students are responsible for making prior arrangements with their athletic, academic or work obligations for this time.

Cheating:

The act of obtaining answers or completing assignments in a fraudulent or deceitful manner. Disciplinary action will be determined by staff and administrators. Possible zero grade for assignment and possible suspension. (One hour – three days)

Attendance:

Grand Ledge High School's attendance policy is based on two facts. First of all, it is the school's task to teach promptness and responsibility. Good attendance habits in school will help make students reliable adults. Moreover, their attendance record becomes part of their permanent record. Many employers consider attendance to be equally as important as a student's grade point average.

Reporting Procedures:

- Documentation in the form of a phone call or written note must be received by the attendance office for each absence (517) 925-5818.
- Documentation must be received within 48 hours of the student's return to class.
- Documentation will be kept in the student's attendance file. This is significant in the appeals process.

There are three types of absences:

1. **Explained (AE)** – Absences due to personal illness, professional appointments, funerals, or serious personal or family problems. Arrangements for all work, tests, or quizzes missed due to an explained absence **must be initiated by the student** with all teachers prior to or upon the day of return. All make-up work must be completed and submitted to teachers in direct relation to the number of days absent, i.e. two days absent equals two days to submit all make-up work. Teachers reserve the right to prioritize any make-up assignments, tests, or quizzes within the make-up window.

2. **Unexplained (AU)** – Absences that are not in the explained category. Examples would be shopping trips, barber or beauty appointments, missing the bus, oversleeping etc. In the case of an unexplained absence, the student will not receive credit for any homework or missed test during the absence. The student will be issued detentions or possible suspension depending on the number of truancy offenses.

3. **School Related Absences (AS)** – Absences due to a school field trip, college visit, athletic event other school related activities. Arrangements for all work, tests or quizzes missed due to a school related absence **must be initiated by the student** with all teachers prior to or upon the day of return. All make-up work must be completed and submitted to teachers in direct relations to the number of days absent, i.e. two days absent equals two days to submit all make-up work. Teachers reserve the right to prioritize any make-up assignments, tests, or quizzes within the make-up window.

- **Family Vacation Policy** – Parents are discouraged from having their students excused from school for vacations or trips. A student who wishes to take part in a planned vacation will be excused if the request is made at least five (5) school days in advance of the scheduled vacation. Arrangements for all work, tests or quizzes missed due to an excused absence **must be initiated by the student** with all teachers prior to or upon the day of return. All make-up work must be completed and submitted to teachers in direct relation to the number of days absent, i.e. two days absent equals two days to submit all make-up work.
- **Checking out of School** – A student who must leave school for any reason during

the day MUST OBTAIN A DISMISSAL SLIP AND SIGN OUT IN THE OFFICE BEFORE LEAVING. Failure to sign out may result in an unexcused absence for those hours missed and detention/suspension will be assigned.

- **Seven Absence Limit** –A student must not exceed seven (7) total absences in each class per trimester. Once a student has accumulated seven (7) absences in a class, he/she must:

1. Earn a passing grade (60%) in the class; and

2. Pass the final comprehensive exam (60%) at the end of the trimester.

If (1) and (2) above are not achieved, the student will receive an "F" for the class and will not receive credit for the trimester.

Tardy:

Being tardy is not a responsible practice. A tardy is defined as not being in the room when the bell completes ringing. Tardies cannot be excused; however students are given two (2) tardies per trimester without penalty (for emergencies). Teachers will record tardies as part of their attendance taking procedures.

- Three (3) tardies to class equal one absence.
- Excessive tardies may result in the loss of privileges and/or disciplinary action.