

# PHYSICS 360: AP PHYSICS B COURSE SYLLABUS

Class meets daily from 7:41 - 8:59 am. The main focus of this class is to prepare students to take the AP Physics B Examination in May. This is achieved through a combination of classroom lecture, discussion, laboratories, and self-directed home assignments. Students must complete all labs and home assignments to fulfill course requirements. Students are highly encouraged to work together in groups, however all work must be original and unique.

Textbook: *Physics AP Edition*, James S. Walker, Third Edition, Upper Saddle River, NJ: Prentice Hall. ISBN # 0-13-153631-1

Suggested Supplements: Students are encouraged to use an AP Review Workbook of their choosing

A Course Outline and Laboratory Experiment List is listed below. Keep in mind that these are minimum requirements of the course.

Unit	Reading	Recommended Self Directed Work
<b>I. Measurement and Orientation</b>		
1 Measurement and Laboratory Technique		
A Statistics and uncertainty in measurement	Walker Chapter 1	Pages 14 – 16: 5 - 47 ODD
B Graphical Data Presentation		Physics I Review Skills packet
C Scientific and Technical Lab Writing		
2 Vectors		
A Addition / Subtraction	Walker Chapter 3	Page 75-78: 5 - 61 ODD
B Decomposition		AP HW #3: Vectors
C Unit Vectors		
D The Dot and Cross Products		
<b>II. Statics</b>		
3 Rotational Motion		
A Angular Quantities	Walker Chapter 10	Problems Pages 308 – 314: 1 – 63 ODD
B Rotational Kinematics		AP HW #9: Rotational Motion
C Moment of Inertia		
D Rolling Motion and Torque		
E Conservation of Energy (including rotation)		
4 Equilibrium		
A Translational vs. Rotational Equilibrium	Walker Chapter 11	Problems Pages 350 – 357: 1 - 61 ODD 65, 85, 86, 93, 94
B Center of Mass and Stability		AP HW #10: Rotation and Equilibrium
C Angular Momentum		
D Conservation of Angular Momentum		
E Gyroscopes		
<b>III. FLUID DYNAMICS AND THERMAL PHYSICS</b>		
5 Fluid Dynamics		
A Bulk, Apparent, and True Density	Walker Chapter 15	Problems Page 508 – 511: 1- 57 ODD
B Absolute and Gauge Pressure		AP HW #11: Fluids
C Archimedes Principle and Buoyancy		
D Bernoulli's Equation		
6 Temperature, Heat, and Phase Changes		
A Temperature Scales, Zeroth Law of Thermodynamics	Walker Chapter 16	pp. 543 – 544: 1 – 21 ODD 27, 33, 37, 42, 45
B Heat Transfer Mechanisms	Walker Chapter 17	
C Specific and Latent Heats		pp. 579 – 580: 1 – 23 ODD
D Kinetic Theory and Ideal Gases		AP HW #12: Temperature and Heat

#### 7 Thermodynamics

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|---|---|-------------------|--|
| A | First Law of Thermodynamics, Conservation of Energy | Walker Chapter 18 | pp. 619 – 622: 1 – 9 ODD, 11, 15, 17, 21, 25, 29, 63, 67 |
| B | Second Law of Thermodynamics, Entropy               |                   | AP HW #14: The Laws of Thermodynamics                    |
| C | Third Law of Thermodynamics, Absolute Zero          |                   |  |
| D | Heat Engines  |                   |  |
| E | P-V Diagrams  |                   |  |

#### IV. ELECTRICITY AND MAGNETISM

##### 8 Electric Charges, Forces, and Fields

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|---|--------------------------------|-------------------|----------------------------|
| A | Electric Charges               | Walker Chapter 19 | pp. 657 - 659: 1 - 47 ODD  |
| B | Coulomb's Law                  |                   | AP HW #16: Electric Charge |
| C | Electric Field and Field Lines |                   |                            |
| D | Charging by Induction          |                   |                            |
| E | Electric Flux                  |                   |                            |

##### 9 Electric Potential

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|---|----------------------------|-------------------|-------------------------------|
| A | Electric Potential Energy  | Walker Chapter 20 | pp. 689 - 692: 1 - 51 ODD     |
| B | Point Charge Potential     |                   | AP HW #17: Electric Potential |
| C | Equipotential Surfaces     |                   |                               |
| D | Capacitors and Dielectrics |                   |                               |

##### 10 Electric Current / DC Circuits

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|---|----------------------------------|-------------------|-----------------------------|
| A | Electric Current                 | Walker Chapter 21 | pp. 726 - 729: 1 - 59 ODD   |
| B | Ohm's Law                        |                   | AP HW #18: Electric Current |
| C | Electric Power                   |                   |                             |
| D | Resistors in Series and Parallel |                   |                             |
| E | Kirchoff's Rules                 |                   |                             |
| F | RC Circuits                      |                   |                             |

##### 11 Magnetism

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|---|--|-------------------|---------------------------|
| A | Magnetic Fields                          | Walker Chapter 22 | pp. 762 - 765: 1 - 47 ODD |
| B | Magnetic Force and Charged Particles     |                   | AP HW #19: Magnetism      |
| C | Current Loops and Solenoids              |                   |                           |
| D | Magnetic Force on Current Carrying Wires |                   |                           |

##### 12 Magnetic Flux

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|---|-------------------------------------|-------------------|---------------------------|
| A | Induced EMF                         | Walker Chapter 23 | pp. 797 - 800: 1 - 43 ODD |
| B | Magnetic Flux and Faraday Induction |                   |                           |
| C | Lenz's Law                          |                   |                           |
|   | Generators and Motors               |                   |                           |

#### V. ATOMIC AND NUCLEAR PHYSICS

##### 13 Quantum Physics

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|---|--------------------------------------|-------------------|-----------------------------|
| A | Plank's Quantized Energy             | Walker Chapter 30 | pp. 1030 - 1032: 1 - 39 ODD |
| B | Photoelectric Effect / Work Function |                   | AP HW #23: Atomic Physics   |
| C | Relativistic Mass of a Photon        |                   |                             |
| D | Scattering and Compton Effect        |                   |                             |
| E | Heisenberg Uncertainty               |                   |                             |

##### 14 Atomic Physics

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|---|-------------------------------|-------------------|-----------------------------|
| A | Models of the Atom            | Walker Chapter 31 | pp. 1067 - 1069: 1 - 37 ODD |
| B | The Hydrogen Atom             |                   |                             |
| C | Electron (Energy) Transitions |                   |                             |

15 Nuclear Physics

- A Radioactivity
- B Nuclear Decay
- C Binding Energy
- D Fusion and Fission

Walker Chapter 32 pp. 1107 - 1108 1 - 21, 35 - 57 ODD  
AP HW #24: Nuclear Physics

VI. MECHANICAL WAVE BEHAVIOR

16 Simple Harmonic Motion

- A Oscillations about Equilibrium
- B Relation between SHM and Circular Motion
- C Energy Conservation in SHM
- D The Pendulum

Walker Chapter 13 pp. 425 - 427: 1 - 57 ODD

17 Waves and Sound

- A Waves on a String
  - B Sound Waves
  - C Wave Intensity
  - D The Doppler Effect
- Interference / Standing Waves / Beats

Walker Chapter 14 pp. 469 - 473: 1 - 71 ODD  
AP HW #15: Waves and Sound

VII. EM WAVES AND OPTICS

18 Electromagnetic Waves

- A Wave / Particle Theory of Light
- B Propagation of EM Waves
- C Electromagnetic Spectrum
- D Polarization

Walker Chapter 25 pp. 864 - 868: 1 - 73 ODD  
AP HW #20: EM Spectrum

19 Geometric Optics

- A Reflection / Refraction of Light
- B Spherical Mirrors
- C Ray Tracing
- D Mirror / Lens Equation

Walker Chapter 26 pp. 902 - 906: 1 - 75 ODD  
AP HW #21: Optics

20 Interference and Diffraction

- A Wave Superposition and Interference
- B Young's Double Slit Interference
- C Single Slit Diffraction
- D Diffraction Gratings

Walker Chapter 28 pp. 964 - 968: 1 - 67 ODD  
AP HW #22: Diffraction and Interference

VIII. NEWTONIAN MECHANICS (Review)

21 Kinematics: Motion in One Dimension

- A Position / Velocity / Acceleration vs. Time Graphing
- B Instantaneous Velocity
- C Freefall

Walker Chapter 2 Page 48- 54: #19 - 41, 57 - 69 ODD  
AP HW #2: One Dimensional Kinematics

22 Kinematics: Motion in Two Dimensions

- A Basic Equations
- B General Launch Angle
- C Finding Initial Velocity

Walker Chapter 4 Page 101-105: #1 - 31, 51 - 71 ODD  
AP HW#4: Two Dimensional Kinematics

23 Newton's Laws		
A Newton's First Law of Motion	Walker Chapter 5	Pages 136-140 Problems 1 - 57 ODD
B Newton's Second Law of Motion		AP HW#5: Newton's Laws
C Newton's Third Law of Motion		
D Free Body Diagrams		
24 Application of Newton's Laws		
A Frictional Forces	Walker Chapter 6	Pages 171-178 Problems 1 - 41 ODD 52 - 58
B Connected Objects - Atwood's Machine		AP HW #6: Application of Newton's Laws
C Circular Motion		
D Inclined Planes		
25 Work and Kinetic Energy		
A Work by Constant and Variable Force	Walker Chapter 7	Pages 200 – 203 Problems: 1 - 35, 47 - 63 ODD
B Kinetic Energy		AP HW #7: Work and Kinetic Energy
C Work Energy Theorem		
D Power		
26 Potential Energy and Energy Conservation		
A Conservative and Nonconservative Forces	Walker Chapter 8	Pages 234 – 236 Problems: 13 - 37 ODD
B Potential Energy		
C Conservation of Mechanical Energy		
D Equipotential Curves		
27 Conservation of Momentum		
A Center of Mass	Walker Chapter 9	Pages 275: 1 - 21 ODD
B Linear Momentum		AP HW #8: Linear Momentum
C Impulse Momentum Theory		
D Collisions - Elastic and Inelastic		
28 Gravitation		
A Universal Law of Gravitation	Walker Chapter 12	Problems Pages 389 – 391: 1 – 39 ODD
B Kepler's Laws of Motion		

Grading Policy: Grades are assigned on a point basis. Typical point values: Examinations - 125 points, labs - 100 points, self-directed work - 25 to 50 points. Failure to complete required assignments may result in automatic failure. All work is due on the date indicated when assigned; late work is not accepted (see me if extenuating circumstances apply).