

## Physics Course Syllabus

Mr. Elan Hiller Room 507

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**Prerequisite:** "C" or better in previous Mathematics class or by teacher recommendation.

**Course Text:** Foundations of Physics by Tom Hsu, Ph.D First Edition

### Course Topics Semester One

#### Unit 1: Chapters 1-2

Science Fundamentals

- Understand Graphs
- Independent vs. Dependent
- Solve Equations
- Metric Conversions
- Scientific Method/Investigations

#### Unit 2: Chapters 3-4

Kinematics

- Describing motion (velocity, acceleration and distance)
- Understanding Vectors (1D and 2D)
- Vocabulary of Motion
- Kinematic Graphs
- Kinematic Equations

#### Unit 3: Chapters 5-6

Motion and Force in One Dimension

- Newton's 3 Laws
- Newton's Law of Gravitation
- Inertia: Newton's 1<sup>st</sup>,  $F=ma$ : Newton's 2<sup>nd</sup>, Equal and Opposite: Newton's 3<sup>rd</sup>.
- Force Diagrams
- Equilibrium and Net Force
- Weight, Friction, Tension, Applied

#### Unit 4: Chapter 7

Motion and Force in 2 and 3 Dimensions

- Vectors and direction
- Projectile Motion and the velocity vector
- Forces in 2 Dimension

#### Unit 5: Chapter 8

Motion in Circles

- Describing objects moving in a circle, angular speed in radians per second.
- Centripetal Force and Centripetal Acceleration.
- Newton's Law of Universal Gravitation and Orbital Motion.

#### Unit 6: Chapters 10-11

Energy, Kinetic and Potential, Conservation of Energy, Work.

- Kinetic Energy Equation
- Potential Energy Equation
- Conservation of Energy

- Work=Force\*Distance
- Work-Energy Theorem

### **Unit 7: Momentum: Chapter 12**

#### Energy and Momentum

- 1D Collisions (2D\*)
- Conservation of Energy-Elastic
- Conservation of Momentum
- Impulse

### **Unit 8: Thermal Energy**

- Temperature
- Energy Transfer
- 1<sup>st</sup> and 2<sup>nd</sup> Laws of Thermodynamics
- Efficiency
- Heat Engines, Refrigerators
- PV diagrams\*
- $Q=mC\Delta T$

### **Grading Policy**

#### **Scholarship grade:**

Scholarship grades will be determined by the following:

- 10% Assignments (Daily Homework, Notes, Classwork)**
- 20% Lab, Performance Tasks and Projects and Notebooks**
- 60% Chapter Exams**
- 10% District End of Course Exam (Final)**

#### **Grading Program**

I will post all assignments, tests, and their scores on **jupitergrades.com** It is the responsibility of the student AND parent/guardian to monitor the student's progress on **jupitergrades.com** account on a regular basis.

#### **Assignments:**

- Homework and notes are given DAILY! Use pencils ONLY!!!
- Late homework will not be accepted unless your absence is justified.

#### **Assessments:**

- Test corrections can be done after taking a test to improve the score.
- Students received half the credit back to the test by learning from their mistakes.
- Must complete corrections within 2 weeks of getting test back and must be done in class.

## Citizenship grade:

Criteria for citizenship grades are:

- Truancies and tardies
- Being prepared for class
- Consistently turning in assignments
- Participation in class and being on-task
- Following all class rules and expectations

### Materials

- 3-ring binder that will contain ALL notes and homework and LAB work organized.
- Supply of pencils (mechanical pencil), red pens for grading, lined paper and graph paper.
- Graphing Calculator: a scientific calculator will be sufficient.

## Classroom Expectations

### Class Expectations:

- Stay in your assigned seat unless you have permission otherwise
- Follow all teacher instructions
- Respect yourself, others, and their property
- No food or drink. Bottled water okay
- **Electronic devices may only be used** when explicitly stated.
- **NO** working on other course assignments during physics class!

### Attendance Policy:

- It is YOUR responsibility to find out what you miss when you are absent and make it up. (**# of days to make up work = # of days absent**)
- Clear your absences! Citizenship grade is lowered one letter grade for each truant
- "Two freebie" tardies given. Citizenship will be lowered one letter grade for each tardy thereafter.
- Tardies and truancies may **ONLY** be cleared through Saturday School.
- Hall passes: Plan your time accordingly.

### Academic Dishonesty:

- Automatic zero on test or assignment
- Parent phone call home
- Any work submitted by a student in this course for academic credit must be the student's own work. You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e-mail, an e-mail attachment file, a diskette, or a hard copy.
- Should copying occur, neither the student who copied the work nor the student who gave material to be copied will receive credit for that particular assignment. District policy will be followed. If there are ever any questions, comments, or concerns, please email me at [luis.mendoza@sweetwaterschools.org](mailto:luis.mendoza@sweetwaterschools.org). That is the best way to get in touch with me. Otherwise, leave me a message with the front office at (619) 397-2000.

NGSS Sequence 2017-2018

Course: <a href="http://www.nextgenscience.org/evidence-statements">http://www.nextgenscience.org/evidence-statements</a>		
Unit/Topic	Subtopics	PEs or Rationale/Justification
Science Fundamentals  <i>July-Early August</i>	<b>Understand Graphs</b> <b>Independent vs. Dependent</b> <b>Solve equations</b> <b>Metric Conversions</b> <b>Scientific Method/Investigations</b>	Before we can teach forces (PS-2-1 to 2-4), students must be able to understand and describe motion, as well as the basic mathematics of a physics course.
Kinematics <ul style="list-style-type: none"> <li>Describing motion (velocity, acceleration, distance)</li> </ul> <i>August</i>	Understanding Vectors (1D and 2D*) Vocabulary of Motion Kinematic Graphs Kinematic Equations	Before we can teach forces (PS-2-1 to 2-4), students must be able to understand and describe motion, as well as the basic mathematics of a physics course.
Forces and Interactions <ul style="list-style-type: none"> <li>Newton's 3 Laws</li> <li>Newton's Law of Gravitation</li> </ul> <i>September (through end of quarter 1)</i>	Inertia- Newton's 1st <b>F=ma- Newton's 2nd</b> Equal and Opposite- Newton's 3rd Force Diagrams Equilibrium & Net Force Weight, Friction, Tension, Applied <b>Newton's Law of Universal Gravitation</b> Centripetal Force, Torque* Hooke's' Law*	This meets standards: - HS-PS-2-1 - HS-PS-2-4 (gravitation part)
Energy <ul style="list-style-type: none"> <li>Kinetic and Potential</li> <li>Conservation of Energy</li> <li>Work</li> </ul> <i>October</i>	<b>Kinetic Energy Equation</b> <b>Potential Energy Equation (*elastic)</b> <b>Conservation of Energy</b> Work= Force x Distance Work-Energy Theorem Power Circular Motion*	HS-PS-3-1 HS-PS-3-2 HS-PS-3-3
Momentum  <i>Late October-mid November</i>	1D Collisions (2D*) Conservation of Energy- Elastic <b>Conservation of Momentum</b> <b>Impulse</b>	HS-PS-2-2 HS-PS-2-3

Thermal Energy  <i>mid November-finals</i>	Temperature <b>Energy Transfer</b>	HS-PS-3-1 HS-PS-3-4
	<b>1st and 2nd Law of Thermodynamics</b> Efficiency	Having the concepts of refrigerators and heat engines brings in the engineering concepts embedded in NGSS
	Heat Engines, Refrigerators	
	PV diagrams* Q=mCΔT	

NGSS Sequence 2016-2017

Course:		
Unit/Topic	Subtopics	PEs or Rationale/Justification
Mechanical Waves <ul style="list-style-type: none"> <li>● Frequency, Wavelength, etc.</li> <li>● Transverse v. Longitudinal</li> <li>● Sound Waves</li> </ul> <i>January-Early February</i>	Simple Harmonic Motion <b>v=fλ</b>	HS-PS-4-1
	Harmonics Resonance* Interference	
	Medium and Temperature Dependency	
	Doppler Effect Wave Interactions	
Electromagnetic Radiation <ul style="list-style-type: none"> <li>● EM Spectrum</li> <li>● Wave-Particle Duality</li> <li>● Photoelectric Effect</li> <li>● Big Bang Theory</li> </ul> <i>February-March (to Spring Break)</i>	Memorize EM Spectrum Double-Slit Experiment Wave Interactions (reflection, diffraction, refraction, interference, polarization, absorption, etc.) <b>Energy of EM waves &amp; Effects</b>	HS-PS-4-5 HS-PS-4-3 HS-PS-4-4 HS-PS-4-2 HS-ESS-1-2  The standard requires real-world applications of EM radiation and its effects- examples could include sunburns, microwaves and cancer, tanning beds, etc.
	<b>Particle vs. Wave model of light</b> <b>Photoelectric Effect</b>	
	<b>Red shift (Doppler Effect)</b> <b>Real World Applications- radio, microwave, ultrasound, hologram, etc.</b>	
Electrostatics <ul style="list-style-type: none"> <li>● Coulomb's Law</li> <li>● Electric Fields</li> <li>● Electric Potential</li> <li>● Electric PE</li> </ul>	<b>Coulomb's Law</b> <b>Electric Fields &amp; Force</b>	HS-PS-2-4 HS-PS-3-5
	Drawing Electric Fields Charge Interactions	

<i>Early to mid-April</i>		
Circuits <ul style="list-style-type: none"> <li>● Ohm's Law</li> <li>● Series vs. Parallel</li> </ul>	V=IR P=IV Circuit Diagrams Paying for electricity	We believe circuits are fun and interesting for students, it is a basic concept that can provide the background for understanding conservation of electric energy, motors, generators, etc.
<i>Mid-April- Mid-May</i>	Conductors vs. Insulators AC vs. DC* Series vs. Parallel Electrical Safety (Fuses/Breakers)	
	Capacitors* Complex Circuits*	
	Kirchhoff's Laws*	
Electromagnetism <ul style="list-style-type: none"> <li>● Magnetic Fields</li> <li>● Electric Motors</li> <li>● Electric Generators</li> <li>●</li> </ul>	Drawing Magnetic Field lines Magnetic Force Right-hand rule <b>Electric Current induces Magnetic Field</b> Electromagnets Earth's Magnetic Field & Compass Magnetic Flux Changing Magnetic flux induces voltage which creates current Motors Generators	HS-PS-2-5
<i>mid-May - Finals</i>		

Please fill out the following clearly and keep it in your binder

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## Acknowledgement of Course Syllabus and Student Information

Mr. Hiller

I have read and have become familiar with the Course Syllabus and the BVHS Student Handbook.

Student Name (Print) \_\_\_\_\_ Period \_\_\_\_\_

Student Signature \_\_\_\_\_

Parent/Guardian Name (Print) \_\_\_\_\_

Parent/Guardian Signature \_\_\_\_\_

Email Address of Parent/Guardian: \_\_\_\_\_

Best number to reach Parent/Guardian at: \_\_\_\_\_