

## Spectrum Program

### Session 1

#### Course Title: Introductory Physics Honors

### Course Description

“Enhance the way you see the physical world.” — Paul G. Hewitt, physicist, instructor and author. Students build a strong conceptual understanding of physical principles ranging from force and motion to classical mechanics. With this foundation, students are equipped to understand the equations and formulas of physics and to make connections between concepts and their everyday world. Introductory Physics Honors is a first year high school physics course and prepares students for advanced or AP Physics.

### Essential Questions

- What physical forces affect how our world operates?
- How can we use these forces in our everyday lives?

### Outcomes

Upon successful completion of this course, students will:

- Know the basic conceptual framework commonly used for mechanics, electricity, and magnetism
- Understand how these frameworks were discovered and developed
- Apply scientific processes and knowledge within physics to predict the results of experiments and other hypothetical scenarios
- Analyze the world around them, think critically about the causes of events, and use this knowledge to create useful predictions and constructions

### Instructional Strategies

Students will be presented with a variety of methods designed to illustrate physical principles. Visual demonstrations, group laboratory activities, practice worksheets, and optional extension topics will all be major components of this course. Students will be provided with the opportunity to complete hands-on experiments and demonstrations in addition to receiving lectures and reading assignments.

### Resources and Materials

- **Books**
  - a. Serway and Faughn, Physics, 2009, ISBN-13: 978-0-03-036817-2, ISBN-10: 0-03-036817

#### Materials

- a. A scientific or graphing calculator is required.
- b. 3-ring binder
- c. Notebook or loose leaf paper
- d. Pencils and Pens

### Student Assessment

- **Pre-Assessment**

Students will be given a written, multiple choice pre-assessment that includes questions relating to the learning objectives for each topic. The pre-assessment will not be calculated as part of the student's final grade.
- **CTD Grading Scale**

A+	100-97%	A	96-93%	A-	92-90%
B+	89-87%	B	86-83%	B-	82-80%
C+	79-77%	C	76-73%	C-	72-70%
D+	69-67%	D	66-63%	D-	62-60%
F	below 60%				

- **Breakdown of Final Grade**

- 40% Homework and worksheets
- 10% Quizzes
- 20% Labs
- 30% Tests

- **Post-Assessment**

Students will be given the same assessment as was presented on the first day. Pre-Assessment and Post-Assessment scores will be compared. The post-assessment will/will not be calculated as part of the student's final grade.

### Schedule

Date	Topic(s)	In-class Activities	Assignments/Assessments
6/27/2011	<u>The Science of Physics</u> •Measurement •Proportionality and equations •Graphing relationships •Modeling •Pendulums	•Paper tower lab •Pendulum lab •Measurement lab •Graphing relationships activity	Reading: Chapter 1 <u>Worksheet(s):</u> •Science of physics <u>In Class Assessment:</u> •Pre-assessment •Science of Physics Quiz
6/28/2011	<u>One Dimensional Motion</u> •Position •Velocity •Acceleration •Free Fall	•Constant velocity vehicle lab •Air rockets •Measuring Gravity •Hoverpucks/Hovercraft	Reading: Chapter 2 <u>Worksheet(s):</u> •1-D Motion WS <u>In Class Assessment:</u> •1-D Motion Quiz
6/29/2011	<u>Vectors</u> •Perpendicular •Non/Perp •Adding •Subtracting •Components  <u>Two Dimensional Motion</u> •Crosswind and rivers •Projectiles	•Paper river demonstration •Treasure Map lab •Marble Target lab •Angled projectile launching •Shoot the monkey	Reading: Chapter 3 <u>Worksheet(s):</u> •Vectors WS •Projectiles WS <u>In Class Assessment:</u> •Vector and 2-D motion quiz

Date	Topic(s)	In-class Activities	Assignments/Assessments
6/30/2011	<u>Forces</u> •4 Fundamental Forces •Net Force •Free body diagrams •Newton's Laws •Mass and Weight •Friction •Elevators/Fish •Inclined planes •Pulleys	•Newton's laws demonstrations •Hall's Carriage lab •Friction lab •Elevator lab	Reading: Chapter 4 <u>Worksheet(s):</u> •Newton's Laws WS •Elevators, Fish, Inclined Planes, and Pulleys <u>In Class Assessment:</u> •Forces quiz
7/1/2011	<u>Work and Energy</u> •Work •Energy conservation •Types of energy •Skateboarding and rollercoasters •Power	•Identifying types of energy activity •Bowling ball pendulum •Hot wheels U track lab •Horsepower lab	Reading: Chapter 5 <u>Worksheet(s):</u> •Energy WS •Power WS <u>In Class Assessment:</u> •Work and Energy Quiz  <b>Week 1 Test</b>
7/4/2011	<u>Momentum</u> •Momentum conservation •Momentum entering and leaving a system •Impulse •Collisions	•Collision cart lab •Egg throw/drop •Ballistics pendulum	Reading: Chapter 6 <u>Worksheet(s):</u> •Impulse •Conservation <u>In Class Assessment:</u> •Momentum quiz
7/5/2011	<u>Circular Motion, Torque, and Gravitation</u> •Components of torque •Centripetal force and acceleration •Orbital motion	•Torque meter balance •Turntables/crop circles activity •Centripetal force lab •De Brahe/Copernican solar system •model computer simulation	Reading: Chapter 7 <u>Worksheet(s):</u> •Torque •Centripetal force and motion <u>In Class Assessment:</u> •Torque quiz •Circular motion and gravitation quiz
7/6/2011	<u>Electric Fields and Forces</u> •Charge •Coulomb's Law •Insulators and conductors •Transferring charge •Drawing and interpreting electric field lines	•Balloon lab •Electroscope lab •Electric field hockey	Reading: Chapter 16 <u>Worksheet(s):</u> •Coulomb's Law •Transferring Charge •Electric fields <u>In Class Assessment:</u> •Electric Forces and Fields quiz

Date	Topic(s)	In-class Activities	Assignments/Assessments
7/7/2011	<u>Electrical Energy and Current</u> <ul style="list-style-type: none"> <li>•Electric potential energy</li> <li>•Capacitance</li> <li>•Amperage</li> <li>•Resistance</li> </ul>	<ul style="list-style-type: none"> <li>•Resistor lab</li> <li>•Ohm's law lab</li> <li>•Light bulb activity</li> </ul>	Reading: Chapter 17 <u>Worksheet(s):</u> <ul style="list-style-type: none"> <li>•Electric potential and potential energy</li> <li>•Resistors and simple circuits</li> </ul> <u>In Class Assessment:</u> <ul style="list-style-type: none"> <li>•Electrical Energy and Current quiz</li> </ul>
7/8/2011	<u>Circuits and Circuit Elements</u> <ul style="list-style-type: none"> <li>•Series and Parallel circuit elements</li> <li>•Ohm's Law</li> <li>•AC/DC</li> </ul>	<ul style="list-style-type: none"> <li>•Light bulb activity</li> <li>•Series and Parallel circuit lab</li> </ul>	Reading: Chapter 18 <u>Worksheet(s):</u> <ul style="list-style-type: none"> <li>•Series and Parallel circuits</li> </ul> <u>In Class Assessment:</u> <ul style="list-style-type: none"> <li>•Circuits quiz</li> </ul> <b>Week 2 Test</b>
7/11/2011	<u>Vibrations and Waves</u> <ul style="list-style-type: none"> <li>•Simple harmonic motion</li> <li>•Wave pulses</li> <li>•Sine waves</li> <li>•Wavelength, speed, and frequency</li> <li>•Types of waves with physical examples</li> <li>•Boundaries</li> <li>•Wave interference</li> <li>•Standing waves</li> <li>•Earthquakes and Tsunamis</li> </ul>	<ul style="list-style-type: none"> <li>•Slinky and snakey lab</li> <li>•Computer wave simulators</li> <li>•Expo Marker demonstration</li> <li>•Slow motion video demonstration</li> </ul>	Reading: Chapter 11 <u>Worksheet(s):</u> <ul style="list-style-type: none"> <li>•Simple Harmonic Motion</li> <li>•Waves</li> <li>•Interference</li> <li>•Standing waves</li> </ul> <u>In Class Assessment:</u> <ul style="list-style-type: none"> <li>•Vibrations and Waves quiz</li> </ul>
7/12/2011	<u>Sound</u> <ul style="list-style-type: none"> <li>•Models of sound</li> <li>•Speed of sound</li> <li>•Resonance</li> <li>•Instruments</li> <li>•Doppler effect</li> <li>•Beats</li> <li>•Decibels, human perception of sound</li> <li>•The ear</li> </ul>	<ul style="list-style-type: none"> <li>•Measuring the speed of sound               <ul style="list-style-type: none"> <li>•Outdoors</li> <li>•Indoors</li> </ul> </li> </ul>	Reading: Chapter 12 <u>Worksheet(s):</u> <ul style="list-style-type: none"> <li>•Sound basics</li> <li>•Resonance and standing waves</li> </ul> <u>In Class Assessment:</u> <ul style="list-style-type: none"> <li>•Sound quiz</li> </ul>
7/13/2011	<u>Light</u> <ul style="list-style-type: none"> <li>•Models of light</li> <li>•EM Spectrum</li> <li>•Reflection</li> <li>•Planar and curved mirrors</li> <li>•Refraction</li> <li>•Lenses</li> <li>•Color</li> <li>•Polarization</li> </ul>	<ul style="list-style-type: none"> <li>•Plane mirrors lab</li> <li>•Curve mirrors lab</li> <li>•Color mixing apparatus demonstration</li> <li>•Lenses lab</li> </ul>	Reading: Chapter 13 <u>Worksheet(s):</u> <ul style="list-style-type: none"> <li>•Light basics</li> <li>•Reflection</li> <li>•Refraction</li> <li>•Color</li> </ul> <u>In Class Assessment:</u> <ul style="list-style-type: none"> <li>•Light quiz</li> </ul>

Date	Topic(s)	In-class Activities	Assignments/Assessments
7/14/2011	<u>Magnetism/Induction</u> <ul style="list-style-type: none"> <li>•Models of magnetism</li> <li>•Poles</li> <li>•Domains</li> <li>•Magnetic fields</li> <li>•Inductors</li> <li>•Generators</li> <li>•Transformers</li> </ul> <u>Review</u> <ul style="list-style-type: none"> <li>•Structured</li> <li>•Worksheets</li> <li>•Q and A</li> </ul>	<ul style="list-style-type: none"> <li>•Magnets activity</li> <li>•Current producing magnetic field demonstration</li> <li>•Magnetic field producing current demonstration</li> <li>•PHET inductance computer simulation</li> </ul>	Reading: Chapter 19/20 <u>Worksheet(s):</u> <ul style="list-style-type: none"> <li>•Magnetism</li> <li>•Induction</li> </ul> <u>In Class Assessment:</u> <ul style="list-style-type: none"> <li>•Magnetism quiz</li> </ul>
7/15/2011	<u>Final Exam</u>  <u>Post-Assessment</u>  <u>Parent Teacher Conferences</u>	--	<u>Final Exam</u>  <u>Post-Assessment</u>

**CTD Statement on Third-Party Web Sites**

Instructors are required to thoroughly review any third-party web sites they intend to use in their courses for inappropriate content. However, because web content continuously changes, CTD disclaims any responsibility for any of the content contained on third-party web sites used in course materials. If you become aware of anything that may be inappropriate, please notify CTD staff immediately.