

Equinox Program

Course Title: Physics Honors

Course Description

Physics helps explain, predict and control physical phenomena. This course emphasizes fundamental principles of nature through the study of classical physics. Through lecture, discussion, demonstration, video, laboratory work and collaborative problem solving, students explore topics including linear, rotational, and wave motion; force; momentum; energy; and electrostatics and circuits. Physics Honors is a demanding course for students who wish to complete a full-year high school physics course in an accelerated format.

Essential Questions

- How do you measure objects and events?
- How do you represent physical quantities and their relationships?
- How and why do material objects and physical fields change?
- What symmetries and conservation principles govern physical interactions?

Outcomes

Upon successful completion of this course, students will:

- Know laws of nature and principles of scientific understanding
- Understand how scientific models fit reality, and when approximations are valid
- Employ models that predict and explain physical phenomena, make observations and measurements, analyze data and determine whether it supports a hypothesis
- Articulate their ideas about the physical world

Instructional Strategies

- Collaborative engagement – whiteboard sessions, group work on labs and problem sets, one-to-one and one-to-all dialogue in lecture and discussion
- Multiple representations – using words, graphs, equations, proportionalities, and diagrams
- Socratic questioning – digging for reliable intuitions while unearthing alternate conceptions that undermine comprehensive scientific models
- Building on previous concepts and skills to construct understanding of new topics
- Flexible work groups in lab and classroom allow for differentiated instruction

Resources and Materials

- Textbook: Knight and Jones, College Physics: A Strategic Approach, 2nd Ed., 2010, ISBN 9780321595485
- Websites
 - a. Mastering Physics www.masteringphysics.com
 - b. Physics Classroom www.physicsclassroom.com/
 - c. PhET <http://phet.colorado.edu/simulations/index.php?cat=Physics>
- Materials: 3-ring binder, scientific calculator (TI 30XA or above), 3 colors of pencils or pens.
- Laptops are welcome (not required)

Student Assessment

- **Pre-Assessment:** a pair of nationally normed conceptual and quantitative physics tests.
- **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**
20% labs, 20% homework & class work, 30% quizzes and tests, 30% final exam
- **Post-Assessment:** a pair of nationally normed conceptual and quantitative physics tests.

Schedule

Date	Topics	In-class Activities	Assignments/Assessments
6/28	Magnetism	Lecture, discussion, lab, collaborative problem solving, guided practice	Ch. 24, Ch 3.1, Worksheets
6/29	Electrostatics; Energy	Lecture, discussion, lab, collaborative problem solving, guided practice	Ch. 10, 20, 21 Worksheets, Lab
6/30	Electric Current and Circuits	Lecture, discussion, lab, collaborative problem solving, guided practice	Ch. 22, 23 Worksheets, Lab
7/1	Electromagnetism	Lecture, discussion, lab, collaborative problem solving, guided practice	Ch. 25 Worksheets
7/2	Electromagnetic Induction	Lecture, discussion, sim lab, collaborative problem solving, guided practice	E&M Test Worksheets
7/5	Motion - Free Particle model	Lecture, discussion, lab, collaborative problem solving, guided practice	Ch. 1, 2 Worksheets, Lab
7/6	Force	Lecture, discussion, lab, collaborative problem solving, guided practice	Ch. 3.3-4, Ch.4 Worksheets
7/7	Momentum	Lecture, discussion, lab, collaborative problem solving, guided practice	Ch. 9 Worksheets, Lab
7/8	Acceleration (& Linearization)	Lecture, discussion, lab, collaborative problem solving, guided practice	Ch. 2.5-7, Ch. 5 Worksheets, Lab
7/9	Constant Force Particle model	Lecture, discussion, lab, collaborative problem solving, guided practice	Mechanics Test Worksheets
7/12	2D Motion	Lecture, discussion, lab, collaborative problem solving, guided practice	Ch. 3.6-3.8, Ch. 6 Worksheets, Lab
7/13	Gravitation	Lecture, discussion, collaborative problem solving, guided practice	Ch. 8.3, Ch. 10 Worksheets
7/14	Oscillations and Waves	Lecture, discussion, lab, collaborative problem solving, guided practice	Ch. 14,15 Worksheets
7/15	Sound and Light	Lecture, discussion, collaborative problem solving, guided practice	Ch. 16, 17 Worksheets
7/16	FINAL EXAM		

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.

SAMPLE