

Warren County School District

PLANNED INSTRUCTION

COURSE DESCRIPTION

Course Title: Physics College Preparatory

Course Number: 00350

Course Prerequisites: Algebra Based Math Course

Course Description:

Physics College Preparatory, as a scientific discipline, is a study of the relationship between matter and energy. This course deals with the physical laws that describe the behavior of nature. Topics include force, motion, energy, momentum, wave mechanics, and electricity. An emphasis is placed on mathematical description of natural phenomena and on problem solving. Final assessment required.

Suggested Grade Level: Grades 11-12

Length of Course: ☐ One Semester ☒ Two Semesters ☐ Other (Describe)

Units of Credit: 1 (Insert *None* if appropriate)

PDE Certification and Staffing Policies and Guidelines (CSPG) Required Teacher Certifications:
56 Physics

Certification verified by WCSD Human Resources Department: ☒ Yes ☐ No

TEXTBOOK AND SUPPLEMENTAL MATERIALS

Continue using Board approved textbook? ☒ Yes ☐ No (If yes, then complete the information below.)

Board Approved Textbooks, Software, Supplemental Materials:

Title: Glencoe Physics Principles and Problems

Publisher: McGraw Hill

ISBN #: 978-0-07-6777476-0

Copyright Date: 2017

Date of WCSD Board Approval: May 14, 2018

BOARD APPROVAL:

Date Written: 2/28/18

Date Approved: May 14, 2018 (November 5, 2018)

Implementation Date: 2018-2019

SPECIAL EDUCATION AND GIFTED REQUIREMENTS

The teacher shall make appropriate modification to instruction and assessment based on a student's Individual Education Plan (IEP) or Gifted Individual Education Plan (GIEP).

COURSE OVERVIEW

PA Academic Standards:

Standard - 3.1.P.A9; - 3.2.P.B1; Standard - 3.1.P.B6; Standard - 3.1.P.C4; Standard - 3.2.P.A6; Standard; Standard - 3.2.P.B7; Standard - 3.3.P.A8; Standard - 3.3.P.B3

- Compare and contrast scientific theories.
- Know that both direct and indirect observations are used by scientists to study the natural world and universe.
- Identify questions and concepts that guide scientific investigations.
- Formulate and revise explanations and models using logic and evidence.
- Recognize and analyze alternative explanations and models.
- Explain the importance of accuracy and precision in making valid measurements.
- Examine the status of existing theories.
- Evaluate experimental information for relevance and adherence to science processes.
- Judge that conclusions are consistent and logical with experimental conditions.
- Interpret results of experimental research to predict new information, propose additional investigable questions, or advance a solution.
- Communicate and defend a scientific argument.

Standard - 3.2.P.B1

Differentiate among translational motion, simple harmonic motion, and rotational motion in terms of position, velocity, and acceleration.

Use force and mass to explain translational motion or simple harmonic motion of objects.

Relate torque and rotational inertia to explain rotational motion.

Standard - 3.2.P.B2

Explain the translation and simple harmonic motion of objects using conservation of energy and conservation of momentum.

Describe the rotational motion of objects using the conservation of energy and conservation of angular momentum.

Explain how gravitational, electrical, and magnetic forces and torques give rise to rotational motion.

Standard - 3.2.P.B3

Analyze the factors that influence convection, conduction, and radiation between objects or regions that are at different temperatures.

Options

Standard - 3.2.P.B4

Explain how stationary and moving particles result in electricity and magnetism.

Develop qualitative and quantitative understanding of current, voltage, resistance, and the connections among them.

Explain how electrical induction is applied in technology.

Options

Standard - 3.2.P.B5

Explain how waves transfer energy without transferring matter.

Explain how waves carry information from remote sources that can be detected and interpreted.

Describe the causes of wave frequency, speed, and wave length.

Standard - 3.2.P.B6

PATTERNS SCALE MODELS CONSTANCY/CHANGE

Use Newton's laws of motion and gravitation to describe and predict the motion of objects ranging from atoms to the galaxies.

REQUIRED COURSE SEQUENCE

A. Conventions of Measurement

B. Kinematics

1. Motion in One Dimension

a. Displacement

b. Time.

c. Velocity

d. acceleration

2. Motion in Two Dimensions

a. Vectors

(1). Motion

(2). Force

b. Projectiles

C. Dynamics

1. Newton's Laws of Motion

a. First Law—Inertia

b. Second Law $F=ma$

(1). Static ($\text{Net } F = 0$)

(2). Dynamic ($\text{Net} = 0$)

c. Third Law--Action/reaction

(1). Momentum

- (2). Impulse
- (3). Conservation of momentum

D. Energy

- 1. Work and Power
- 2. Kinetic and Potential Energy
- 3. Conservation of Energy

E. Circular motion

- 1. Rotational motion
 - a. Static
 - (1). Torque
 - b. Dynamics
- 2. Gravitational Forces and Field
 - a. Newton's Law of Universal Gravitation
 - b. Kepler's Three Laws of Motion
 - c. Special Theory

F. Periodic Motion

- 1. SHM
- 2. Wave Mechanics
 - a. Properties
 - b. Types
 - c. Interactions
- 3. Light
 - a. Optics
- 4. EM

G. Direct Current

H. Laboratory – Once per Week

Objectives:

- A. Plan and conduct investigations, analyze and interpret data, and demonstrate scientific reasoning and logic as well as the use of models.
- B. Apply physics to real world scenarios.
- C. Investigate and understand the interrelationships among mass, distance, force and time.
- D. Investigate and understand that quantities including, mass, energy, momentum, and charge are conserved.
- E. Interpret wave phenomena and wave characteristics.
- F. Diagram and construct basic electrical circuits and explain the functions of various circuit components.
- G. Investigate and understand how to use the field concept to describe the effects of gravitational, electric, and magnetic forces.
- I. Compare and contrast Newtonian physics and modern physics.

ASSESSMENT

Portfolio Assessment: ☐ Yes ☒ No

District-Wide Common Final Examination Required: ☒ Yes ☐ No

Course Challenge Assessment (Describe): successful completion of the final examination for the course with an 80% or better

WRITING TEAM: Warren County School District Teachers

WCSD STUDENT DATA SYSTEM INFORMATION

1. Is there a required final examination? ☒ Yes ☐ No

**Warren County School District Policy 9741 and 9744 state, "All classes in grades 9-12 shall have a final exam."*

2. Does this course issue a mark/grade for the report card? ☒ Yes ☐ No

3. Does this course issue a Pass/Fail mark? ☐ Yes ☒ No

4. Is the course mark/grade part of the GPA calculation? ☒ Yes ☐ No

5. Is the course eligible for Honor Roll calculation? ☒ Yes ☐ No

6. What is the academic weight of the course?

☐ No weight/Non credit

☒ Standard weight

☐ Enhanced weight