PETERS TOWNSHIP SCHOOL DISTRICT

CORE BODY OF KNOWLEDGE (CBK)

PHYSICS ACADEMIC

GRADES 11 AND 12

For each of the sections that follow, students may be required to understand, apply, analyze, evaluate or create the particular concepts being taught.

COURSE DESCRIPTION

This course is designed to increase the student's understanding and appreciation of the physical world. This course will emphasize how the laws of physics apply to everyday life. This course is not recommended for students who plan careers in engineering. We will study some or all of the following topics: the nature of science, measurement and problem solving, velocity, acceleration, Newton's laws, forces, periodic motion, momentum and energy. Mathematics skills are very important in physics; we will utilize algebra extensively and well as some basic trigonometry. Students will be required to use and develop problem solving skills in both lecture and laboratory portion of the course. Physics will be presented as a unified body of knowledge in which the student will become familiar with observable facts about the physical universe. The student is expected to make connection with the subject matter across topics and disciplines in an interactive, often technological environment. Mathematics will be utilized to enable the student to quantify these observable phenomena. A calculator is required for this course. This course meets six periods per week with one class meeting being a double period primarily used for laboratory. Class periods for teaching days are occupied with interactive lectures, demonstrations, discussions, problem solving sessions and additional hands-on and laboratory investigations. This is a very student-centered/hands on course. This course does not cover the depth of a topic as in Honors Physics. This course also uses a large portion of class time to practice and ask questions about problems and concepts.

STUDY SKILLS

- Students will be given unit assignments for each topic with problems that are representative to those on the topic exam.
- Time during class will be utilized to practice more complex example problems that are representative to those on the topic exam.
- Students are encouraged to work in study groups on homework assignments and to prepare for exams so that they can self-reflect on their true level of understanding of the course material.

MAJOR UNIT THEMES:

1. **INTRODUCTION TO PHYSICS**

   - Topics in physics and the role of physics as the most fundamental science
   - Scientific methodology
   - Role of models and diagrams in physics
   - Science vs. technology

2. **MEASUREMENT AND PROBLEM SOLVING**

   - Systems of measurement with emphasis on metric units
   - Conversions from one unit to another
   - Measurement tools and techniques
   - Error analysis including accuracy, precision, and proper use of scientific notation and significant figures
   - Graphing techniques and analysis for both hand and computer generated graphs

3. **ONE-DIMENSIONAL MOTION**

   - One dimensional linear motion and the physical quantities that describe motion
   - Equations of uniformly accelerated motion
   - Free fall
   - Describing motion as represented by a position-time, velocity-time and acceleration-time graph

4. **TWO-DIMENSIONAL MOTION AND VECTORS**

   - Vector and scalar quantities
   - Graphical methods of vector analysis
   - Trigonometric methods of vector analysis
   - Projectile motion using the equations of kinematics in two dimensions

5. **FORCES AND THE LAWS OF MOTION**

   - Forces
   - Newton 's Three Law of Motion
   - Friction
   - Newton 's Second Law applications
   - Torque and Equilibrium

6. CIRCULAR AND SATELLITE MOTION

- Uniform circular motion
- Law of Universal Gravitation
- Satellite Motion

7. SIMPLE HARMONIC MOTION AND OSCILLATING SYSTEMS

- Oscillatory motion
- Mass-spring systems
- Simple pendulum

8. WORK, ENERGY AND POWER

- Work, energy, and power
- Types of Energy
- Law of Conservation of Mechanical Energy

9. MOMENTUM AND COLLISIONS

- Linear momentum
- Laws of Conservation of Momentum
- Collisions

MATERIALS (and Supplemental materials used in course):

- Textbook – Holt Physic - Raymond A. Serway and Jerry S. Faughn, 2002 by Holt, Rinehart and Winston

- Selections from "The Mechanical Universe" video set
- JAVA applets from http://www.walter-fendt.de/ph14e/
- Selected readings from www.Physicsclassroom.com

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