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# PETERS TOWNSHIP HIGH SCHOOL

## COURSE SYLLABUS: PHYSICS ACADEMIC

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### **Course Overview and Essential Skills**

Physics Academic 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. Students 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, energy, and waves. 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. 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 also uses a large portion of class time to practice and ask questions about problems and concepts.

### **Course Textbook and Required Materials**

Zitzewitz, Haase, and Harper. (2017). *Glencoe Physics: Principles and Problems*. McGraw-Hill Education. ISBN #978-0-07-677476-0.

Online textbook, supplemental resources and homework supplied through McGraw-Hill ConnectED <https://connected.mcgraw-hill.com/connected/login.do>

Class notebook and binder, writing utensils, scientific calculator, ruler

### **Course Outline of Material Covered:**

| Unit                              | Concepts/Skills/Resources                                                                                                                                   | Approximate Weeks |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Kinematics and Motion             | Describing motion mathematically, graphically and qualitatively (terminology, problem solving and graphs of motion)<br><br><i>Textbook Chapters 2 and 3</i> | 4-5               |
| Forces and Dynamics               | Everyday forces, Newton's three laws and their application<br><br><i>Textbook Chapter 4</i>                                                                 | 3-4               |
| Two Dimensional Motion and Forces | Vectors, projectile motion, two-dimensional forces and second law applications<br><br><i>Textbook chapters 5 and 6</i>                                      | 6-7               |

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|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Energy and Momentum                  | <p>Impulse and momentum, conservation of momentum, Work, power and energy, conservation of mechanical energy and work-energy theorem</p> <p><i>Chapters 9, 10 and 11</i></p> | 5-6 |
| Rotational Motion                    | <p>Uniform circular and satellite motion, rotational kinematics, rotational dynamics and angular momentum</p> <p><i>Chapters 6,7,8 and 9</i></p>                             | 4-5 |
| Vibrations and Waves                 | <p>Simple harmonic motion, Wave properties and behaviors, mechanical waves and sound, Electromagnetic waves and light</p> <p><i>Textbook Chapters 14,15,16,17 and 18</i></p> | 5-6 |
| Electrostatics and Electric Circuits | <p><i>Electric charge and Coulomb's Law, basic Circuits</i></p> <p><i>Textbook Chapters 20,22,23</i></p>                                                                     | 3-4 |