

Physics I Syllabus

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Textbook: (Optional) Zitzewitz, P., et al. (2005). *Physics: Principles and Problems*. Columbus: Glencoe.

Website: www.tieslerphysics.com

Course Overview: Physics is the branch of science that is concerned with the nature of matter and energy. Through quantitative and qualitative research and investigations, students will utilize the principles and laws of Physics to gain a better understanding of the world around them. This course is designed as an introduction to the field of Physics and is intended to provide students who wish to pursue science, engineering or STEM related careers a foundation from which to further their study of this exciting branch of science.

Expectations: Due to the fast pace of this course, attendance and active participation in class activities is extremely important. Your success will require you to stay current in your reading, have assignments completed on time and come to class prepared to discuss the day's scheduled topic. All assignments and due dates will be posted on the class webpage. Students are expected to have access to internet enabled computers, tablets and/or smartphones outside of class. If you do not have access to the internet outside of school, please notify your instructor.

Course Outline:

- 0) Introduction to Physics Measurements
 - a. A Physics Toolkit
 - i. Mathematics and Physics
 - ii. Measurement
 - iii. Graphing Data
- 1) Mechanics
 - a. Representing Motion
 - i. Picturing Motion
 - ii. Where and When?
 - iii. Position-Time Graphs
 - iv. How Fast?

- b. Accelerated Motion
 - i. Acceleration
 - ii. Motion with Constant Acceleration
 - iii. Free Fall
- c. Motion in Two Dimensions
 - i. Projectile Motion
 - ii. Circular Motion
- d. Forces in One Dimension
 - i. Force and Motion
 - ii. Using Newton's Laws
 - iii. Interaction Forces
- e. Forces in Two Dimensions
 - i. Vectors
 - ii. Friction
 - iii. Force and Motion in Two Dimensions
- f. Gravitation
 - i. Planetary Motion and Gravitation
 - ii. Using the Law of Universal Gravitation
- g. Rotational Motion
 - i. Describing Rotational Motion
 - ii. Rotational Dynamics
 - iii. Equilibrium

2) Energy

- a. Energy, Work and Simple Machines
 - i. Energy and Work
 - ii. Machines
- b. Energy and Its Conservation
 - i. The Many Forms of Energy
 - ii. Conservation of Energy
- c. Momentum
 - i. Impulse and Momentum
 - ii. Conservation of Momentum
- d. Thermal Energy
 - i. Temperature and Thermal Energy
 - ii. Changes of State and the Laws of Thermodynamics

3) Electricity and Magnetism

- a. Static Electricity
 - i. Electric Charge
 - ii. Electric Force
- b. Electric Fields
 - i. Creating and Measuring Electric Fields
 - ii. Applications of Electric Fields
- c. Current Electricity
 - i. Current and Circuits
 - ii. Using Electric Energy

- d. Series and Parallel Circuits
 - i. Simple Circuits
 - ii. Applications of Circuits
 - e. Magnetic Fields
 - i. Magnets: Permanent and Temporary
 - ii. Forces Caused by Magnetic Fields
 - f. Electromagnetic Induction
 - i. Electric Current from Changing Magnetic Fields
 - ii. Changing Magnetic Fields Induce EMF
 - g. Electromagnetism
 - i. Interactions of Electric and Magnetic Fields and Matter
 - ii. Electric and Magnetic Fields in Space
- 4) Waves and Light
- a. Vibrations and Waves
 - i. Periodic Motion
 - ii. Wave Properties
 - iii. Wave Behavior
 - b. Sound
 - i. Properties and Detection of Sound
 - ii. The Physics of Music
 - c. Fundamentals of Light
 - i. Illumination
 - ii. The Wave Nature of Light
 - d. Reflection and Mirrors
 - i. Reflection from Plane Mirrors
 - ii. Curved Mirrors
 - e. Refraction and Lenses
 - i. Refraction of Light
 - ii. Convex and Concave Lenses
 - iii. Applications of Lenses
 - f. Interference and Diffraction
 - i. Interference
 - ii. Diffraction

Grades: Grades will be calculated as follows

- Tests – 50%
- Labs (Formal and Informal) – 25%
- Quizzes – 15%
- Homework – 10%

Homework: Although homework accounts for only 10% of your overall grade, it is a vital component for success in Physics. While a missed homework assignment will only have a minor direct impact on your grade, the indirect effect on your performance on larger assessments will be much more significant. The purpose of homework is to provide you with practice mastering the skills and concepts that are central to the Physics curriculum. There are no substitutes or shortcuts for this. Simply put, the more effort you put into your homework, the higher your test scores will be. Most homework assignments will be completed and submitted online through the Physics LE website.

Participation & Responsibility: Science is a collaborative process. As a scientist or engineer (or in any other career field) you will often have to work as a member of a team. Much of the in-class work and activities we will engage in will be team based. You are expected to be a respectful and productive contributor to all team based activities and to the overall class culture.

Quizzes/Activities/In class work/Informal labs: These interim assessments will be periodically given to check your understanding of the concepts and skills being covered. All quizzes will be announced beforehand and performance expectations for activities, in-class projects and informal labs will be clearly communicated.

Formal Lab Reports: There will be several formal lab reports assigned throughout the course. Strong emphasis will be placed on presentation and analysis of data. Formal lab reports will be graded according to the rubric posted on the class webpage.

Tests: Tests will be given at periodic intervals to assess your understanding of major concepts and proficiency in problem solving. (See above for unit structure.) Tests will be announced at least one week prior to administration.

Quiz and Test Retakes: Students are permitted to retake up to two quizzes and one test *per semester*. Retakes may not be taken during regularly scheduled class or lab periods and must be completed within one week of the administration of the test or quiz.

Absences: If you are absent it is your responsibility to stay current with the work that is done in class. You will be expected to contact the instructor or a classmate and access the webpage to get homework assignments, retrieve materials and keep current with deadlines and due dates.

Extra Help: I am available for extra help after school by appointment.