

Franklin Public Schools**Physics
Grade 11 or 12
College Preparatory**

This course is for the student who has interest in physical sciences and who is preparing to enter college in science or other fields. To be successful, students should have completed Algebra I, Geometry, Algebra II and/or Trigonometry. Students are required to design and construct three projects.

1. Motion and Forces

Broad concept: Newton's laws of motion and gravitation describe and predict the motion of most objects.

- 1.1 Distinguish between vector quantities (velocity, acceleration and force) and scalar quantities (speed and mass).
- 1.2 Illustrate how to represent vectors graphically and be able to add them graphically.
- 1.3 Distinguish between, and solve problems involving, velocity, speed and constant acceleration.
- 1.4 Create and interpret graphs of motion (position vs. time, speed vs. time, velocity vs. time, constant acceleration vs. time).
- 1.5 Explain the relationship between mass and inertia.
- 1.6 Interpret and apply Newton's first law of motion.
- 1.7 Interpret and apply Newton's second law of motion to show how an object's motion will change only when a net force is applied.
- 1.8 Use a free body force diagram with only co-linear forces to show forces acting on an object and determine the net force on it.
- 1.9 Qualitatively distinguish between static and kinetic friction, what they depend on and their effects on the motion of objects.
- 1.10 Interpret and apply Newton's third laws of motion.
- 1.11 Understand conceptually Newton's law of universal gravitation.
- 1.12 Identify appropriate standard international units of measurement for force, mass, distance, speed, acceleration and time and explain how they are measured.

2. Conservation of Energy and Momentum

Broad concept: The laws of conservation of energy and momentum provide alternate approaches to predict and describe the movement of objects.

- 2.1 Interpret and provide examples that illustrate the law of conservation of energy.
- 2.2 Provide examples of how energy can be transformed from kinetic to potential and vice versa.
- 2.3 Apply quantitatively the law of conservation of mechanical energy to simple systems.
- 2.4 Describe the relationship between energy, work and power both conceptually and quantitatively.
- 2.5 Interpret the law of conservation of momentum and provide examples that illustrate it. Calculate the momentum of an object.
- 2.6 Identify appropriate standard international units of measurement for energy, work, power, and momentum.