

Material Covered:

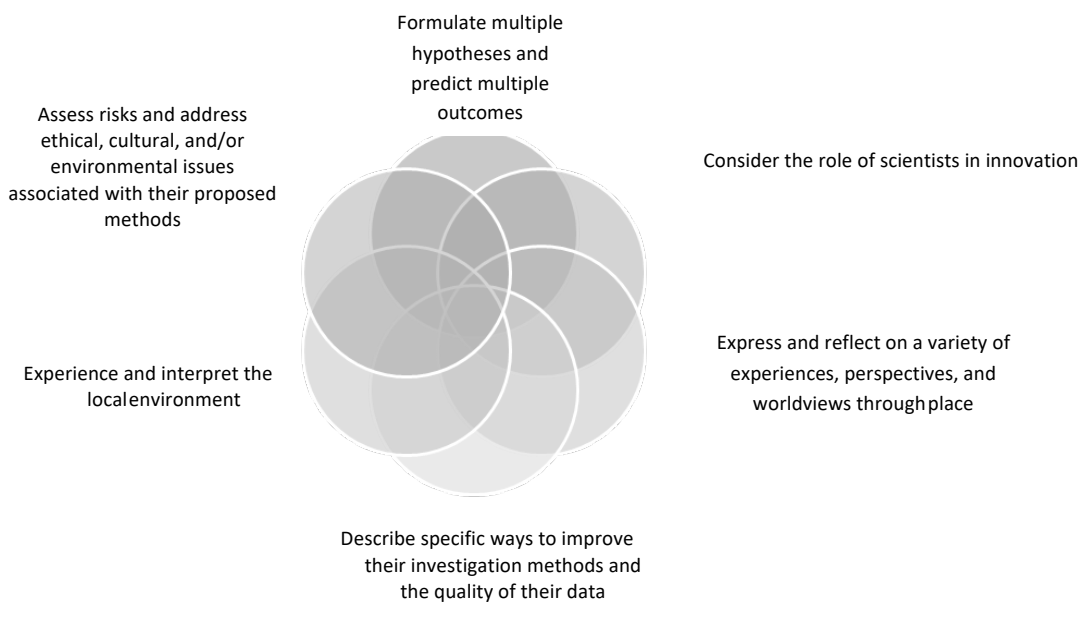
The course is comprised of the following four main themes:

- An object's motion can be predicted, analyzed, and described.
- Forces influence the motion of an object.
- Energy is found in different forms, is conserved, and has the ability to do work.
- Mechanical waves transfer energy but not matter.

Course Design:

Physics 11 is a course that explores how the physical world works by focusing on motion, forces, energy, and mechanical waves. You will learn how an object's motion can be predicted and analyzed, how forces affect that motion, how energy exists in different forms and can do work, and how mechanical waves transfer energy without moving matter. Through a mix of hands-on labs and theoretical learning, you will connect physics concepts to real-life situations. This course builds a strong foundation for Physics 12 while encouraging curiosity and critical thinking.

These are the Curricular Competencies for the course:

**Textbook:**

This course uses the *BC Science Physics 11* (Edvantage Interactive, 2015) ISBN 978-0-9864778-3-6

Foundations of Physics

Goal:

This introductory unit, which uses Chapter 1 (pp. 1-33) of the textbook, will review key science skills and explore the foundational concepts of physics, including measurement, scientific notation, significant figures, and basic motion. You will begin to develop the tools and thinking strategies needed to analyze the physical world and build a strong base for deeper learning in future units.

Objectives:

By the end of this unit, you should be able to:

- Describe the fundamental nature of physics.
- Apply essential physics skills and methods, including:
- Conducting appropriate experiments.
- Systematically gathering and organizing experimental data.
- Producing and interpreting scientific graphs.
- Verifying relationships (such as linear, inverse square, and inverse square) between variables.
- Utilizing models (e.g., physics formulas, diagrams, graphs) to solve diverse problems.
- Using appropriate units and metric prefixes in all calculations and measurements.

What to Do in this Unit:

- Ask your teacher for the Unit 1 Worksheet and complete all the work as directed there.
- When you are ready, submit your work for Unit 1 Worksheet to your teacher for marking.

Kinematics

Goal:

In this unit, which uses Chapter 2 (pp. 37-64) of the textbook, you will explore the principles of kinematics, focusing on how objects move in one and two dimensions. Through the study of scalar and vector quantities, uniform and accelerated motion, and projectile motion, you will develop analytical skills to describe and predict motion using mathematical models, diagrams, and graphs.

Objectives:

By the end of this unit, you should be able to:

- Analyze one-dimensional motion using vector quantities.
- Apply kinematic equations to uniform and accelerated motion.
- Interpret and create motion graphs (position-time, velocity-time).
- Calculate projectile motion components and trajectories.

What to Do in this Unit:

- Ask your teacher for the Unit 2 Worksheet and complete all the work as directed there.
- When you are ready, submit your work for Unit 2 Worksheet to your teacher for marking.

Dynamics

Goal:

This unit, which uses Chapters 3 and 4 (pp. 75-121) of the textbook, focuses on the relationship between force and motion, exploring how forces act on objects and how they affect movement. You will investigate contact forces, gravity, and apparent weight, and will apply Newton's three laws of motion to analyze real-world systems. Emphasis will be placed on developing skills to draw and interpret free-body diagrams and to understand balanced and unbalanced forces in dynamic and static situations.

Objectives:

By the end of this unit, you should be able to:

- Identify and describe various contact forces and explain the factors that influence their magnitude and direction.
- Differentiate between mass, weight, and apparent weight, and explain the role of gravity in force interactions.
- Apply Newton's First, Second, and Third Laws of Motion to predict and explain the motion of objects.
- Construct and analyze free-body diagrams for objects experiencing one or more forces.
- Solve problems involving balanced and unbalanced forces in one-dimensional systems.
- Communicate their reasoning using appropriate physics terminology, equations, and diagrams.
- Connect Newtonian mechanics to everyday experiences and real-world applications.

What to Do in this Unit:

- Ask your teacher for the Unit 3 Worksheet and complete all the work as directed there.
- When you are ready, submit your work for Unit 3 Worksheet to your teacher for marking.
- Complete the **Lab - Friction** and hand in to your teacher for marking.
- Complete the **Comprehensive Exam #1** covering Units 1-3.

Energy

Goal:

This unit, which uses Chapter 5 (pp. 131-160) of the textbook, introduces you to the fundamental concepts of energy, including its conservation, transformation, and transfer. You will explore the principles of work, energy, power, and efficiency, as well as mechanical advantage in simple machines. Connections will be made to traditional knowledge and technologies used by First Peoples. Thermal energy and the concept of thermal equilibrium will also be introduced.

Objectives:

By the end of this unit, you should be able to:

- Perform calculations involving work, force, and displacement.
- Solve problems involving power and efficiency, including calculations related to work, time, and the relationship between input/output work and power. They should also be able to solve problems involving gravitational potential energy.
- Solve problems involving different forms of energy, specifically gravitational potential energy (calculating with mass, acceleration due to gravity, and height) and kinetic energy (calculating with mass and velocity).
- Analyze the relationship between work and energy, with a focus on the law of conservation of energy. This includes relating energy change to work done, stating the law of conservation of energy, and using it to solve problems involving gravitational potential energy, total energy, kinetic energy, and thermal energy (calculating with specific heat capacity, mass, and temperature change).

What to Do in this Unit:

- Ask your teacher for the Unit 4 Worksheet and complete all the work as directed there.
- When you are ready, submit your work for Unit 4 Worksheet to your teacher for marking.
- Complete the **Lab - Energy in a Falling Object** and hand in once complete.

Electrical Circuits

Goal:

In this unit, which uses notes and does not use the textbook, you will be introduced to the fundamental principles of Electricity and DC Circuits, covering the essential concepts of current, voltage, and resistance, and how these elements interact within direct current electrical systems.

Objectives:

By the end of this

- Define and calculate electric current, understanding its relationship to charge and time, and differentiate between conventional current and electron flow.
- Explain voltage (potential difference), its units, and the concept of terminal voltage, including how internal resistance affects a battery's output.
- Define and calculate electrical resistance, understanding its dependence on resistivity, length, and cross-sectional area of a material.
- Analyze and calculate total resistance for resistors connected in series and parallel configurations within DC circuits.
- Calculate electric power dissipated by components in a circuit using various formulas.
- Apply Kirchhoff's Current Law (junction rule) to determine current distribution in a circuit.
- Apply Kirchhoff's Voltage Law (loop rule) to analyze voltage gains and losses in closed circuits.
- Solve complex DC circuits by systematically applying Ohm's Law and Kirchhoff's Laws to determine unknown currents, voltages, and resistances for individual components.
- Understand the function of switches in a circuit and the concept of a short circuit.

What to Do in this Unit:

- Ask your teacher for the Unit 5 Worksheet and complete all the work as directed there.
- When you are ready, submit your work for Unit 5 Worksheet to your teacher for marking.
- Ask your teacher for the Unit 5 Inquiry Project and hand in when complete. Include the **Assessment Rubric** with your project when you submit it for marking.

Waves and Sound

Goal:

In this unit, which uses a combination of notes and Chapter 6 (pp.173-183) in the textbook, you will explore the fascinating world of waves, learning about their fundamental properties such as amplitude, frequency, period, wavelength, phase, and speed, as well as the various types of waves. You will gain proficiency in using the universal wave equation to solve problems involving wave speed, frequency, and wavelength. Furthermore, you will delve into common wave phenomena, understanding and describing reflection, refraction, diffraction, interference (superposition principle), and the Doppler shift, along with the conditions that produce these behaviors.

Objectives:

By the end of this unit, you should be able to:

- Analyze wave behavior: Understand how light and other waves behave under different conditions, referencing wave properties and the universal wave equation.
- Describe wave properties: Define and describe key wave characteristics such as amplitude, frequency, period, wavelength, phase, speed, and various types of waves.
- Apply the universal wave equation: Solve problems using the universal wave equation, relating speed, frequency (or period), and wavelength.
- Understand wave phenomena: Describe and provide examples of common wave phenomena including reflection, refraction, diffraction, interference (superposition principle), and the Doppler effect, along with the conditions under which they occur.
- Identify the characteristics of sound.
- Be familiar with the resonance and frequency of sound.

What to Do in this Unit:

- Ask your teacher for the Unit 6 Worksheet and complete all the work as directed there.
- When you are ready, submit your work for Unit 6 Worksheet to your teacher for marking.
- Complete the **Project - Wave Applications** and hand in to your teacher for marking.
- Complete the **Comprehensive Exam #1** covering Units 4-6.

Congratulations! You have completed Physics 11!