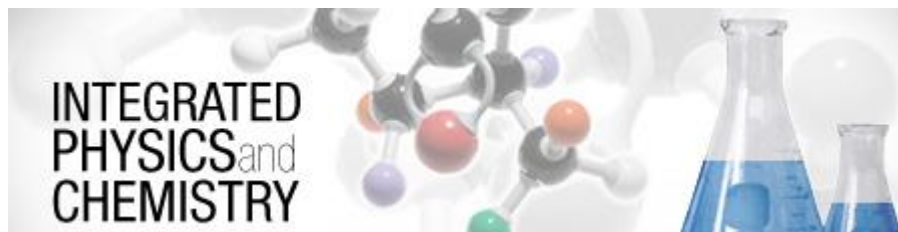


NFC ACADEMY



COURSE OVERVIEW

Integrated Physics and Chemistry is a physical science course designed for high school students needing an entry-level science course covering basic concepts found in chemistry and physics. Topics included in this course are matter, motion and forces, work and energy, electricity and magnetism, and waves.

Throughout the course, students will have opportunities to observe simulations, investigate ideas, and solve problems, both online and away from the computer.

OBJECTIVES

- **EXPLORATIONS IN PHYSICAL SCIENCE:** Students will employ the scientific method, measurements and calculations to conduct experiments.
- **THE STRUCTURE OF MATTER:** Students will explore the structure of matter, including atomic structure, elements, compounds, and mixtures.
- **MATTER AND CHANGE:** Students will explore the chemical changes that matter can go through.
- **STATES OF MATTER:** Students will explore the states of matter and the process that matter goes through for its state to change.
- **MOTION AND FORCES:** Students will describe the motion of objects, Newton's laws that predict that motion, and how the motion is measured.

- **WORK AND ENERGY:** Students will explore various types of energy, simple machines, and the work that they can do.
- **HEAT FLOW:** Students will describe heat, heat flow, and the laws of thermodynamics, as well as explore uses of heat flow.
- **ELECTRICITY AND MAGNETISM:** Students will explore the relationship between electricity and magnetism.
- **WAVES:** Students will explore the properties and characteristics of waves.
- **CHEMISTRY AND PHYSICS IN OUR WORLD:** Students will discuss how chemistry and physics are at work in our daily lives and explore basic astronomical principles.

CURRICULUM CONTENT & SKILL FOCUS

UNIT 1: EXPLORATIONS IN PHYSICAL SCIENCE

- Define science, describe the steps of the scientific method, and make observations
- Identify the units of measurement in the metric system
- Use scales to arrive at precise measurements and describe the difference between accuracy and precision in measurements
- Make measurements, convert between different units, and use measurements to calculate other quantities, such as density

UNIT 2: STRUCTURE OF MATTER

- Make and report measurements while using the metric system
- Use graphs to present and analyze data and calculations
- Calculate and measure volume, mass and calculate density
- Calculate buoyant force
- Calculate specific gravity of a substances

UNIT 3: MATTER AND CHANGE

- Identify the energy changes that cause a substance to change states

- Describe the chemical make-up of an acid and of a base
- Understand that bonding creates new substances with different physical and chemical properties
- State the law of conservation of mass and identify a balanced equation
- Recognize the various types of chemical reactions
- Predict the products of a nuclear decay reaction and the concept of half-life

UNIT 4: STATES OF MATTER

- Describe how bonding patterns determine some of the properties of solids
- State and describe some of the common characteristics of liquids
- Give examples of phenomena that arise due to differences in pressure
- Describe the motion of particles in gases and the statements of the kinetic molecular theory
- State the relationship between pressure and volume in a gas and use Boyle's law to solve pressure/volume problems for gases
- State the relationship between the temperature of a gas and its kinetic energy and use Charles's law to solve temperature/volume problems for gases.

UNIT 5: MOTION AND FORCES

- Apply the concepts of distance and displacement
- Explain the difference between speed and velocity and work problems using the velocity formula
- Describe how a force must be applied to an object to cause acceleration and apply formulas for acceleration
- Demonstrate an understanding of the law of conservation of momentum and perform calculations using the momentum formulas
- Discuss how a force is a vector and demonstrate how to use vector drawing to analyze forces
- Identify and give examples of each of Newton's laws and use Newton's second law in calculations

UNIT 7: WORK AND ENERGY

- Identify types and sources of energy
- Describe the relationship between work and energy and do calculations using the equation for work
- Explain the relationship between work and power and use the formula for power in calculations
- State the law of conservation of energy and use the law of conservation of mechanical energy in calculations
- Identify the types of simple machines and use formulas to calculate IMA and efficiency

UNIT 8: HEAT FLOW

- State and give examples of the zeroth, first, and second laws of thermodynamics
- Describe the changes that occur to the molecules of a substance due to heat flow
- Distinguish between and give examples of heat flow due to conduction, convection, and radiation
- Distinguish between temperature and heat flow
- Observe the volume effects of heat absorption and heat loss as water changes state
- Describe the advantages and disadvantages of different types of refrigerants

UNIT 9: ELECTRICITY AND MAGNETISM

- Identify and describe the charge carriers in an atom
- Identify the parts of a complete circuit and distinguish between direct and alternating current
- Do calculations using the formulas for power
- Describe the properties of the magnetic field and perform calculations relating the strength of magnetic field and the distance to the magnet
- Describe how to make a magnet from a conducting wire and electromagnetic induction

UNIT 10: WAVES

- Describe how waves transmit energy
- Identify the types of waves and describe the various properties of waves
- Provide examples of reflection, refraction, and diffraction
- Discuss how sound waves transmit energy and describe the relationship between the speed of sound and the temperature of a gas, such as air
- Relate the frequency and wavelength of a given type of radiation to its energy and list sources and applications of various types of electromagnetic radiation
- Describe the relationship between absorption, reflection, or transmission of light and color

UNIT 11: CHEMISTRY AND PHYSICS IN OUR WORLD

- Identify which solar energies are transmitted, absorbed, or reflected by Earth's atmosphere
- Compare some positive and negative effects of the use of fossil fuels
- Describe how a spectrum can be analyzed to reveal the chemical make-up of a star
- List Kepler's three laws

ADDITIONAL RESOURCES

All of the activities in this course can be completed with online resources. Integrated Physics and Chemistry partners with our virtual labs for all student labs which will be done online. Integrated Physics and Chemistry also includes extra alternate assignments, experiment/projects and tests for use in enhancing instruction or addressing individual needs.

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GRADING INFORMATION

GRADING COMPONENTS

Lessons	35%
Quizzes	25%
Projects	10% <i>(includes science labs)</i>
Tests	30%

GRADING SCALE

100-90	A
89-80	B
79-70	C
69-60	D
Below 60	F