

## Chemistry 1

SCIH031063

Credits: 0.5 units / 5 hours | NCAA Approved

### Course Description

The course presents an introduction to principles and procedures in chemistry. Students study scientific measurements, chemical names and formulas, states of and changes in matter, numerical relationships in chemical reactions, trends expressed in the periodic table and the behavior of gases. Students calculate empirical and molecular formulas, write and balance equations, determine mole and mass, interpret chemical equations and gain insight into the various models of the atom. This course contains hands-on activities.

**NOTE:** To complete this course entirely online (without Mail Processing), students will need access to a scanner. Specific instructions on how to submit projects electronically are given in the online course management system. This course contains hands-on labs and multimedia activities to provide an in-depth investigation into the subjects presented.

### Graded Assessments

6 Unit Evaluations; 4 Projects; 3 Proctored Progress Tests; 6 Teacher Connect Activities

### Course Objectives

When you have completed the materials in this course, you should be able to:

1. Identify the five traditional areas of organization in the study of chemistry.
2. Identify three steps in the scientific method.
3. Solve numeric and conceptual problems in science.
4. Differentiate three phases of matter.
5. Contrast physical and chemical properties.
6. Contrast and identify chemical and physical changes.
7. Identify and classify matter.
8. Apply the law of conservation of matter.
9. Identify and use the chemical symbols of elements.
10. Use significant digits and scientific notation to communicate numerical values.
11. Use the system international notation when communicating numerical information.
12. Evaluate data to determine the density of a sample.
13. Describe historical experimental methods and theories of the atom.

14. Describe the current model of the atom with subatomic particles.
15. Contrast the mass of isotopes of elements.
16. Use energies and probabilities to describe the modern quantum atom.
17. Write electron configurations of atoms and ions.
18. Calculate values that connect wavelength, frequency, and energy of waves of electromagnetic energy.
19. Use the organization of the Periodic Table of Elements to identify and predict atomic properties.
20. Use valence electrons of atoms to predict atomic and ionic properties.
21. Determine the electric charges of ions and describe properties of ionic bonding.
22. Describe bonding in metals.
23. Compare the properties of ionic compounds to molecular compounds.
24. Describe how sharing of electrons results in the formation of covalent bonds.
25. Use electron dot diagrams to illustrate single, double, and triple bonds.
26. Use valence electron shell pair repulsion theory, hybridization theory, and molecular orbital theory to describe bonding among atoms.
27. Use electronegativity to explain polarity in chemical bonding.
28. Name compounds, ions, and polyatomic ions, and use the names in compounds.
29. Use prefixes and other naming rules to properly name compounds and predict compounds from names.
30. Use the chemist's mole and Avogadro's number to count atoms, molecules, and ions.
31. Identify the volume and moles of a gas at standard temperature and pressure.
32. Calculate the percent composition of a compound or ion.
33. Determine the empirical and molecular formula of a compound.
34. Use the proper steps to write a balanced chemical equation.
35. Describe five general types of chemical reactions.
36. Use net ionic equations to predict the formation of a precipitate.
37. Interpret balanced chemical equations in terms of moles, representative particles, mass, and gas volume.
38. Use mole ratios in stoichiometric calculations.
39. Identify, through calculations, the limiting reactant in a chemical reaction.
40. Use the kinetic theory to describe the behavior and properties of gases, liquids, and solids.
41. Use phase changes to describe physical processes of change for gases, liquids, and solids.
42. Describe the relationships among gas volume, temperature, pressure, and number of particles.
43. Perform calculations that predict the effects of temperature, pressure, and number of particles on the volume for a gas.
44. Use the ideal gas equation to connect temperature, pressure, and number of representative particles on the volume of a gas.
45. Compare and contrast real and ideal gas properties and behaviors.

## Course Outline

### Unit 1 Introduction to Chemistry

Teacher Connect 1  
Lesson 1: Chemistry as the Central Science  
Lesson 2: Matter and Change  
Lesson 3: Scientific Measurement  
Unit 1 Evaluation  
Project 1

### Unit 2 Atoms

Lesson 4: Atomic Structure  
Lesson 5: Electrons in Atoms  
Unit 2 Evaluation  
Teacher Connect 2  
Project 2  
Review for Progress Test 1

### Unit 3 Organizing the Elements

Lesson 6: The Periodic Table  
Lesson 7: Ionic and Metallic Bonding  
Lesson 8: Covalent Bonding  
Unit 3 Evaluation  
Teacher Connect 3  
Project 3

### Unit 4 Names, Formulas, and Quantities

Lesson 9: Chemical Names of Formulas  
Lesson 10: Chemical Quantities  
Unit 4 Evaluation  
Teacher Connect 4  
Review for Progress Test 2

### Unit 5 Reactions and Calculations

Lesson 11: Chemical Reactions  
Lesson 12: Stoichiometry  
Unit 5 Evaluation  
Teacher Connect 5  
Project 4

### Unit 6 States of Matter and Behavior of Gases

Lesson 13: States of Matter  
Lesson 14: The Behavior of Gases  
Unit 6 Evaluation

### Required Textbook and Materials

(available through Follett virtual bookstore at <https://www.bkstr.com/nebraskahighschoolstore>)

**Textbook:** *Pearson Chemistry* (ISBN: 9781323205914)

*Chemistry 1* SCIH031063 (printed course content). This print course content is **optional** for this course.

**Required:** SCIH031063 Lab Kit | CHEMISTRY 1 LAB KIT CONTENTS:

- a balance or kitchen scale

**\*\*\*NOTE\*\*\*: If you already have a kitchen scale or a balance for weighing small objects, then you don't need to purchase the Lab Kit for SCIH 031 063 *Chemistry 1*.**

### Additional Items Needed for Labs, Not Included in Above Kit:

The lab experiments in this course are designed so that they may be successfully completed using the items listed. If you do not have access to the exact items on this list, you may substitute comparable items in the experiments. Suggested household and other common materials necessary to complete the labs in this course are:

- calculator to perform mathematical calculations (TI-30 scientific calculator will work.)
- pencil
- paper
- graphing paper
- ruler
- 2 different types of candy bars (any kind that can be split in half)
- soft tissue or paper towel
- wax paper or magazine paper for making a funnel
- 3 – plastic or paper cups (4 ounce minimum)
- coated candies (3 different brands)
- four rubber balloons (spherical shape)
- set of measuring spoons
- white vinegar (dilute acetic acid:  $\text{CH}_3\text{COOH}$ )
- baking soda ( $\text{NaHCO}_3$ )
- a journal (notebook) to keep non-graded practice problems assigned during the course