Chemistry, Semester A

Course Overview

Chemistry offers a curriculum that emphasizes students' understanding of fundamental chemistry concepts while helping them acquire tools to be conversant in a society highly influenced by science and technology.

The course provides students with opportunities to learn and practice critical scientific skills within the context of relevant scientific questions. Topics include the nature of science, the importance of chemistry to society, atomic structure, bonding in matter, chemical reactions, redox reactions, electrochemistry, phases of matter, equilibrium and kinetics, acids and bases, thermodynamics, quantum mechanics, nuclear reactions, organic chemistry, and alternative energy.

Scientific inquiry skills are embedded in the direct instruction, wherein students learn to ask scientific questions, form and test hypotheses, and use logic and evidence to draw conclusions about concepts. Lab activities reinforce critical thinking, writing, and communication skills and help students develop a deeper understanding of the nature of science.
Throughout this course, students are given an opportunity to understand how chemistry concepts are applied in technology and engineering. Journal and practice activities provide additional opportunities for students to apply learned concepts and practice their writing skills.
This course is built to state standards.

Lab materials needed for this course

Course Components and Grading Rubric

The table gives a breakdown of the weight for each component in the course. Weight represents the percentage of the total score coming from each activity.

Course Components	Count	Weight
Pretest. *A pretest is an optional assessment, typically designed for credit recovery. If a student shows mastery of a lesson objective, the student may be automatically exempted from the upcoming activities associated with the mastered objective. Each passing pretest grade is entered into the gradebook.*	5	0%
Practice. *A practice activity provides instruction similar to that found in a study so that students can practice or review skills necessary to complete their assignment with mastery.*	5	5%
Discussion. *A discussion activity is an opportunity for students to collaborate with*	5	5%

Course Components	Count	Weight
their peers. This activity gives students the opportunity to practice speaking and listening in a clear and logical manner and to receive feedback from peers.		
Journal. *A journal is a short reflective writing exercise that encourages students to connect historical events and ideas to their own lives and circumstances.*	5	5%
Lab. *A lab is a hands-on investigatory activity that can be completed in a couple of class periods. It can include virtual labs, modeling exercises, and engineering design activities.*	5	15%
Mastery Test. *A mastery test is a computer-scored lesson-level summative assessment.*	33	30%
Posttest. *A posttest appears at the end of each unit.*	5	15%
End-of-Semester Test. *An end-of-semester test (EOS) appears at the end of each course.*	1	5%
Teacher-Graded Posttest. *A posttest that prompts students for written responses appears at the end of each unit.*	5	15%
Teacher-Graded End-of-Semester Test. *An end-of-semester test (EOS) that prompts students for written responses appears at the end of each course.*	1	5%
Total	**70**	**100%**

**Teachers may manually adjust these weights if desired, per district grading requirements.*

UNIT 1: CHEMISTRY AND SOCIETY

Lesson and Duration	Description
Pretest: Chemistry and Society *40 minutes*	Complete the pretest (optional).
Chemistry and Society: Unit Overview *1 minute*	Read the unit overview.
LESSON 1 **The Nature of Science: Lesson Overview** *5 minutes*	Read the lesson objectives.
Science and Scientists: Study *45 minutes*	Learn about science and scientists; learn about why scientific processes and discoveries require time and careful work.

Lesson and Duration	Description
Science and Scientists: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
The Scientific Process: Study *45 minutes*	Learn about the scientific method and associated processes that lead to reliable data; learn about scientific controversy.
The Scientific Process: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Journal: Science You Can Trust *40 minutes*	Write about topics in chemistry that connect to daily life.
LESSON 2 **The Importance of Chemistry: Lesson Overview** *5 minutes*	Read the lesson objectives.
Chemistry over Time: Study *45 minutes*	Learn what chemistry is and the history of chemistry.
Chemistry over Time: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Chemistry in the World: Study *45 minutes*	Learn about how chemistry is used in various careers and in medicine and technology, and about how the use of chemicals has impacted the environment both for good and bad.
Chemistry in the World: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Practice: Chemistry in the World *1 hour*	Practice problem-solving skills related to concepts in the lesson.

Lesson and Duration	Description
LESSON 3 **Doing Science: Chemistry and Society: Lesson Overview** *5 minutes*	Read the lesson objectives.
Introduction to Engineering: Study *40 minutes*	Learn about the process of scientific inquiry.
Introduction to Engineering: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Lab: Observing and Inferring *1 hour, 30 minutes*	Use the scientific method and scientific skills to perform a lab experiment.
Prepare to Discuss: Observing and Inferring *5 minutes*	Prepare for a discussion.
Discuss: Observing and Inferring *20 minutes*	Discuss the results of your lab.
UNIT 1 WRAP-UP **Chemistry and Society: Review** *30 minutes*	Prepare for the unit test by reviewing key concepts and skills.
Posttest: Chemistry and Society *1 hour*	Take a computer-scored test to assess what you have learned in this unit.
Teacher-Graded Posttest: Chemistry and Society *1 hour*	Take a teacher-scored test to assess what you have learned in this unit.

UNIT 2: ATOMIC STRUCTURE

Lesson and Duration	Description

Lesson and Duration	Description
Pretest: Atomic Structure *40 minutes*	Complete the pretest (optional).
Atomic Structure: Unit Overview *1 minute*	Read the unit overview.
LESSON 1 **Matter, Forces, and Energy: Lesson Overview** *5 minutes*	Read the lesson objectives.
Matter and Forces: Study *45 minutes*	Learn about matter, the law of conservation of matter, and the forces that act on matter.
Matter and Forces: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Energy: Study *45 minutes*	Learn about the different types of energy and how energy changes form.
Energy: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
LESSON 2 **Atoms: Lesson Overview** *5 minutes*	Read the lesson objectives.
Atomic Structure: Study *45 minutes*	Learn about how all matter is made of atoms; learn about the history of atomic theory; understand the Bohr atom and the differences between neutrons, protons, and electrons.
Atomic Structure: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
The Periodic Table: Study *45 minutes*	Learn how to navigate the periodic table and use it to find numbers of protons, electrons, and neutrons.

Lesson and Duration	Description
The Periodic Table: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Journal: Simplifying Your View of Chemistry *40 minutes*	Write about topics in chemistry that connect to daily life.
LESSON 3 **Elements: Lesson Overview** *5 minutes*	Read the lesson objectives.
Organization and History of the Periodic Table: Study *45 minutes*	Learn about the history of the periodic table; the information in the periodic table; and how the table shows the unity, diversity, and organization of life.
Organization and History of the Periodic Table: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Elements on the Periodic Table: Study *45 minutes*	Learn about the elements of the periodic table.
Elements on the Periodic Table: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Practice: Atomic Structure *1 hour*	Practice problem-solving skills related to concepts in the lesson.
LESSON 4 **Doing Science: Atomic Structure: Lesson Overview** *5 minutes*	Read the lesson objectives.
Civil Engineering: Study *40 minutes*	Learn about the process of scientific inquiry.

Lesson and Duration	Description
Civil Engineering: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Lab: Mass, Volume, and Density *1 hour, 30 minutes*	Use the scientific method and scientific skills to perform a lab experiment.
Prepare to Discuss: Mass, Volume, and Density *5 minutes*	Prepare for a discussion.
Discuss: Mass, Volume, and Density *20 minutes*	Discuss the results of your lab.
UNIT 2 WRAP-UP **Atomic Structure: Review** *30 minutes*	Prepare for the unit test by reviewing key concepts and skills.
Posttest: Atomic Structure *1 hour*	Take a computer-scored test to assess what you have learned in this unit.
Teacher-Graded Posttest: Atomic Structure *1 hour*	Take a teacher-scored test to assess what you have learned in this unit.

UNIT 3: BONDING IN MATTER

Lesson and Duration	Description
Pretest: Bonding in Matter *40 minutes*	Complete the pretest (optional).
Bonding in Matter: Unit Overview *1 minute*	Read the unit overview.

Lesson and Duration	Description
LESSON 1 **Electrons and Periodicity: Lesson Overview** *5 minutes*	Read the lesson objectives.
Electrons and Orbitals: Study *45 minutes*	Learn about energy levels of electrons, electron configurations, and the filling of orbitals.
Electrons and Orbitals: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Predictions and the Periodic Table: Study *45 minutes*	Learn about the patterns in the periodic table and the information that can be gained by using the table.
Predictions and the Periodic Table: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
LESSON 2 **Bonding and Forces: Lesson Overview** *5 minutes*	Read the lesson objectives.
Intramolecular Forces: Study *45 minutes*	Learn about forces within molecules, draw Lewis structures, and make predictions about the type of bond formed between two atoms.
Intramolecular Forces: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Intermolecular Forces: Study *45 minutes*	Learn about the forces between molecules and how they determine properties of substances.

Lesson and Duration	Description
Intermolecular Forces: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Journal: Intermolecular Forces and You *40 minutes*	Write about topics in chemistry that connect to daily life.
LESSON 3 **Compounds and Molecules: Lesson Overview** *5 minutes*	Read the lesson objectives.
Molecular Shape: Study *45 minutes*	Learn how to predict molecular shape.
Molecular Shape: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Naming Substances: Study *45 minutes*	Learn about naming and writing formulas for compounds.
Naming Substances: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Practice: Bonding in Matter *1 hour*	Practice problem-solving skills related to concepts in the lesson.
LESSON 4 **Doing Science: Bonding in Matter: Lesson Overview** *5 minutes*	Read the lesson objectives.
Food: More, Better, Longer: Study *40 minutes*	Learn about the process of scientific inquiry.

Lesson and Duration	Description
Food: More, Better, Longer: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Lab: Periodic Properties *1 hour, 30 minutes*	Use the scientific method and scientific skills to perform a lab experiment.
Prepare to Discuss: Periodic Properties *5 minutes*	Prepare for a discussion.
Discuss: Periodic Properties *20 minutes*	Discuss the results of your lab.
UNIT 3 WRAP-UP **Bonding in Matter: Review** *30 minutes*	Prepare for the unit test by reviewing key concepts and skills.
Posttest: Bonding in Matter *1 hour*	Take a computer-scored test to assess what you have learned in this unit.
Teacher-Graded Posttest: Bonding in Matter *1 hour*	Take a teacher-scored test to assess what you have learned in this unit.

UNIT 4: CHEMICAL REACTIONS

Lesson and Duration	Description
Pretest: Chemical Reactions *40 minutes*	Complete the pretest (optional).
Chemical Reactions: Unit Overview *1 minute*	Read the unit overview.

Lesson and Duration	Description
LESSON 1 **The Mole: Lesson Overview** *5 minutes*	Read the lesson objectives.
The Significance of the Mole: Study *45 minutes*	Learn about moles and their main uses and how to perform unit conversions.
The Significance of the Mole: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Using the Mole: Study *45 minutes*	Learn how to use moles to determine mass percent composition, the empirical formula, and the molecular formula.
Using the Mole: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
LESSON 2 **Changes in Matter: Lesson Overview** *5 minutes*	Read the lesson objectives.
Chemical Reactions: Study *45 minutes*	Learn how to define chemical reactions.
Chemical Reactions: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Types of Reactions: Study *45 minutes*	Learn about the main types of chemical reactions.
Types of Reactions: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.

Lesson and Duration	Description
Journal: Reactions Around You *40 minutes*	Write about topics in chemistry that connect to daily life.
LESSON 3 **Balancing Chemical Reactions: Lesson Overview** *5 minutes*	Read the lesson objectives.
Balancing Inorganic Reactions: Study *45 minutes*	Learn about balancing inorganic chemical reactions.
Balancing Inorganic Reactions: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Balancing Organic Reactions: Study *45 minutes*	Learn about the significance of organic reactions, such as combustion, and how to balance organic reactions.
Balancing Organic Reactions: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Practice: Chemical Reactions *1 hour*	Practice problem-solving skills related to concepts in the lesson.
LESSON 4 **Doing Science: Chemical Reactions: Lesson Overview** *5 minutes*	Read the lesson objectives.
Engines, Fuel, and Green Design: Study *40 minutes*	Learn about the process of scientific inquiry.

Lesson and Duration	Description
Engines, Fuel, and Green Design: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Lab: Precipitation Reactions *1 hour, 30 minutes*	Use the scientific method and scientific skills to perform a lab experiment.
Prepare to Discuss: Precipitation Reactions *5 minutes*	Prepare for a discussion.
Discuss: Precipitation Reactions *20 minutes*	Discuss the results of your lab.
UNIT 4 WRAP-UP **Chemical Reactions: Review** *30 minutes*	Prepare for the unit test by reviewing key concepts and skills.
Posttest: Chemical Reactions *1 hour*	Take a computer-scored test to assess what you have learned in this unit.
Teacher-Graded Posttest: Chemical Reactions *1 hour*	Take a teacher-scored test to assess what you have learned in this unit.

UNIT 5: CHEMISTRY AT WORK

Lesson and Duration	Description
Pretest: Chemistry at Work *40 minutes*	Complete the pretest (optional).
Chemistry at Work: Unit Overview *1 minute*	Read the unit overview.

Lesson and Duration	Description
LESSON 1 **Redox Reactions: Lesson Overview** *5 minutes*	Read the lesson objectives.
Understanding Redox Reactions: Study *45 minutes*	Learn about the significance of redox reactions.
Understanding Redox Reactions: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Balancing Redox Reactions: Study *45 minutes*	Learn about half-reactions and how to balance redox reactions.
Balancing Redox Reactions: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Journal: Redox Reactions in Your Day *40 minutes*	Write about topics in chemistry that connect to daily life.
LESSON 2 **Electrochemistry: Lesson Overview** *5 minutes*	Read the lesson objectives.
Galvanic Cells: Study *45 minutes*	Learn about galvanic cells, batteries, and cell voltages.
Galvanic Cells: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.

Lesson and Duration	Description
Electrolytic Cells: Study *45 minutes*	Learn about spontaneous and nonspontaneous redox reactions, including electrolytic cells.
Electrolytic Cells: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
LESSON 3 **Tying It Together: Lesson Overview** *5 minutes*	Read the lesson objectives.
Calculating with the Periodic Table: Study *45 minutes*	Learn how to calculate average atomic mass and theoretical yield of products, and how to determine the limiting reagent and the percent yield.
Calculating with the Periodic Table: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Scientific Themes: Study *45 minutes*	Learn about the themes that link chemistry to the other sciences.
Scientific Themes: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Practice: Chemistry at Work *1 hour*	Practice problem-solving skills related to concepts in the lesson.
LESSON 4 **Doing Science: Chemistry at Work: Lesson Overview** *5 minutes*	Read the lesson objectives.
Electrical Systems: Study *40 minutes*	Learn about the process of scientific inquiry.

Lesson and Duration	Description
Electrical Systems: Mastery Test *20 minutes*	Take a quiz to assess your understanding of the material.
Lab: Oxidation-Reduction Reactions *1 hour, 30 minutes*	Use the scientific method and scientific skills to perform a lab experiment.
Prepare to Discuss: Oxidation-Reduction Reactions *5 minutes*	Prepare for a discussion.
Discuss: Oxidation-Reduction Reactions *20 minutes*	Discuss the results of your lab.
UNIT 5 WRAP-UP **Chemistry at Work: Review** *30 minutes*	Prepare for the unit test by reviewing key concepts and skills.
Posttest: Chemistry at Work *1 hour*	Take a computer-scored test to assess what you have learned in this unit.
Teacher-Graded Posttest: Chemistry at Work *1 hour*	Take a teacher-scored test to assess what you have learned in this unit.

SEMESTER WRAP-UP

Lesson and Duration	Description
Semester Review: Review *1 hour*	Prepare for the semester exam by reviewing key concepts covered in Semester A.
End-of-Semester Test: Semester Exam *1 hour*	Take a computer-scored exam to demonstrate your mastery of concepts and skills covered in Semester A.

Lesson and Duration	Description
Teacher-Graded End-of-Semester Test: Semester Exam *1 hour*	Take a teacher-scored exam to demonstrate your mastery of concepts and skills covered in Semester A.