

CHEMISTRY, SEMESTER B

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. <i>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.</i>	5	0%
Practice. <i>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.</i>	5	5%

Course Components	Count	Weight
Discussion. <i>A discussion activity is an opportunity for students to collaborate with 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.</i>	5	5%
Journal. <i>A journal is a short reflective writing exercise that encourages students to connect historical events and ideas to their own lives and circumstances.</i>	6	5%
Lab. <i>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.</i>	5	15%
Mastery Test. <i>A mastery test is a computer-scored lesson-level summative assessment.</i>	35	30%
Posttest. <i>A posttest appears at the end of each unit.</i>	5	15%
End-of-Semester Test. <i>An end-of-semester test (EOS) appears at the end of each course.</i>	1	5%
Teacher-Graded Posttest. <i>A posttest that prompts students for written responses appears at the end of each unit.</i>	5	15%
Teacher-Graded End-of-Semester Test. <i>An end-of-semester test (EOS) that prompts students for written responses appears at the end of each course.</i>	1	5%
Total	73	100%

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

UNIT 1: ENERGY IN MATTER

Lesson and Duration	Description
Pretest: Energy in Matter <i>40 minutes</i>	Complete the pretest (optional).
Energy in Matter: Unit Overview <i>1 minute</i>	Read the unit overview.
LESSON 1 Phases of Matter: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.

Lesson and Duration	Description
Kinetic Theory: Study <i>45 minutes</i>	Learn about how the kinetic theory explains phases.
Kinetic Theory: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Solids: Study <i>45 minutes</i>	Learn about the properties of solids, particularly metallic solids.
Solids: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Journal: Phases Around You <i>40 minutes</i>	Write about topics in chemistry that connect to daily life.
LESSON 2 Liquids and Solutions: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Solutions: Study <i>45 minutes</i>	Learn about the properties of solutions, how mixtures are different from solutions, and what factors influence the rate of solution formation.
Solutions: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Melting and Boiling: Study <i>45 minutes</i>	Learn about how intermolecular forces affect melting points, and how addition of solute affects melting and freezing points.
Melting and Boiling: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 3 Gases: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.

Lesson and Duration	Description
Changes in Gases: Study <i>45 minutes</i>	Learn about changes in gases, and about how to use graphs to explain what happens as gases change.
Changes in Gases: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
The Ideal Gas Law: Study <i>45 minutes</i>	Do calculations with absolute temperature, the ideal gas law, and partial pressures.
The Ideal Gas Law: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Practice: Energy in Matter <i>1 hour</i>	Practice problem-solving skills related to concepts in the lesson.
LESSON 4	
Doing Science: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Aeronautical Engineering: Study <i>40 minutes</i>	Learn about the process of scientific inquiry.
Aeronautical Engineering: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Lab: Freezing Point Depression <i>1 hour, 30 minutes</i>	Use the scientific method and scientific skills to perform a lab experiment.
Prepare to Discuss: Freezing Point Depression <i>5 minutes</i>	Prepare for a discussion.
Discuss: Freezing Point Depression <i>20 minutes</i>	Discuss the results of your lab.

Lesson and Duration	Description
UNIT 1 WRAP-UP	
Energy in Matter: Review <i>30 minutes</i>	Prepare for the unit test by reviewing key concepts and skills.
Posttest: Energy in Matter <i>1 hour</i>	Take a computer-scored test to assess what you have learned in this unit.
Teacher-Graded Posttest: Energy in Matter <i>1 hour</i>	Take a teacher-scored test to assess what you have learned in this unit.

UNIT 2: EQUILIBRIUM AND KINETICS

Lesson and Duration	Description
Pretest: Equilibrium and Kinetics <i>40 minutes</i>	Complete the pretest (optional).
Equilibrium and Kinetics: Unit Overview <i>1 minute</i>	Read the unit overview.
LESSON 1	
Equilibrium: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
The Equilibrium Constant: Study <i>45 minutes</i>	Learn about the concept of equilibrium, and about what happens when equilibrium is disturbed.
The Equilibrium Constant: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.

Lesson and Duration	Description
Acid and Base Equilibrium: Study <i>45 minutes</i>	Learn about acids and bases, and about the equilibria of acids and bases.
Acid and Base Equilibrium: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Journal: Maintaining Your Equilibrium <i>40 minutes</i>	Write about topics in chemistry that connect to daily life.
LESSON 2 Acids and Bases: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
The pH Scale: Study <i>45 minutes</i>	Learn about common acids and bases, pH, and pOH.
The pH Scale: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Acid-Base Reactions: Study <i>45 minutes</i>	Learn principles of acid-base reactions, predict products of acid-base reactions, and learn about buffers.
Acid-Base Reactions: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 3 Kinetics: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Reaction Rate: Study <i>45 minutes</i>	Learn about reaction rate.

Lesson and Duration	Description
Reaction Rate: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Calculating the Reaction Rate: Study <i>45 minutes</i>	Learn about how to calculate reaction rate.
Calculating the Reaction Rate: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Practice: Equilibrium and Kinetics <i>1 hour</i>	Practice problem-solving skills related to concepts in the lesson.
LESSON 4 Doing Science: Equilibrium and Kinetics: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Drug Design: Study <i>40 minutes</i>	Learn about the process of scientific inquiry.
Drug Design: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Lab: Disturbing Equilibrium <i>1 hour, 30 minutes</i>	Use the scientific method and scientific skills to perform a lab experiment.
Prepare to Discuss: Disturbing Equilibrium <i>5 minutes</i>	Prepare for a discussion.
Discuss: Disturbing Equilibrium <i>20 minutes</i>	Discuss the results of your lab.

Lesson and Duration	Description
UNIT 2 WRAP-UP	
Equilibrium and Kinetics: Review <i>30 minutes</i>	Prepare for the unit test by reviewing key concepts and skills.
Posttest: Equilibrium and Kinetics <i>1 hour</i>	Take a computer-scored test to assess what you have learned in this unit.
Teacher-Graded Posttest: Equilibrium and Kinetics <i>1 hour</i>	Take a teacher-scored test to assess what you have learned in this unit.

UNIT 3: TRANSFERRING ENERGY

Lesson and Duration	Description
Pretest: Transferring Energy <i>40 minutes</i>	Complete the pretest (optional).
Transferring Energy: Unit Overview <i>1 minute</i>	Read the unit overview.
LESSON 1	
Transferring Heat: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Thermal Energy: Study <i>45 minutes</i>	Learn about thermal energy and heat flow.
Thermal Energy: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Calculating Heat: Study <i>45 minutes</i>	Learn about specific heat and heat calculations.

Lesson and Duration	Description
Calculating Heat: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Journal: Heat Transfer Around You <i>40 minutes</i>	Write about topics in chemistry that connect to daily life.
LESSON 2 Enthalpy: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Enthalpy and Reactions: Study <i>45 minutes</i>	Learn about heat transfer in chemical reactions, about energy storage in chemical bonds, and about the enthalpy of reaction and the enthalpy of formation.
Enthalpy and Reactions: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Calculating Enthalpy: Study <i>45 minutes</i>	Learn about how to use Hess's law.
Calculating Enthalpy: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 3 Entropy and Spontaneity: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Entropy: Study <i>45 minutes</i>	Learn about entropy and its relationship to physical and chemical changes.
Entropy: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.

Lesson and Duration	Description
Spontaneity of a Reaction: Study <i>45 minutes</i>	Learn about the spontaneity of a reaction.
Spontaneity of a Reaction: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Practice: Transferring Energy <i>1 hour</i>	Practice problem-solving skills related to concepts in the lesson.
LESSON 4 Doing Science: Transferring Energy: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Up Into Space: Study <i>40 minutes</i>	Learn about the process of scientific inquiry.
Up Into Space: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Lab: Heats of Reaction <i>1 hour, 30 minutes</i>	Use the scientific method and scientific skills to perform a lab experiment.
Prepare to Discuss: Heats of Reaction <i>5 minutes</i>	Prepare for a discussion.
Discuss: Heats of Reaction <i>20 minutes</i>	Discuss the results of your lab.
UNIT 3 WRAP-UP Transferring Energy: Review <i>30 minutes</i>	Prepare for the unit test by reviewing key concepts and skills.
Posttest: Transferring Energy <i>1 hour</i>	Take a computer-scored test to assess what you have learned in this unit.

Lesson and Duration	Description
Teacher-Graded Posttest: Transferring Energy <i>1 hour</i>	Take a teacher-scored test to assess what you have learned in this unit.

UNIT 4: QUANTUM AND NUCLEAR CHEMISTRY

Lesson and Duration	Description
Pretest: Quantum and Nuclear Chemistry <i>40 minutes</i>	Complete the pretest (optional).
Quantum and Nuclear Chemistry: Unit Overview <i>1 minute</i>	Read the unit overview.
LESSON 1 Quantum Mechanics: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Waves: Study <i>45 minutes</i>	Learn about frequency, wavelength, velocity, and energy of light waves, and about the electromagnetic spectrum.
Waves: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Quantization: Study <i>45 minutes</i>	Learn about the quantization of light and electrons.
Quantization: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 2 Energy in Electrons and Nuclei: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.

Lesson and Duration	Description
Spectra: Study <i>45 minutes</i>	Learn about flame tests, and about absorption and emission spectra.
Spectra: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Nuclear Structure: Study <i>45 minutes</i>	Learn about the structure of the nucleus, and the forces that act within the nucleus.
Nuclear Structure: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Journal: Reflecting on Quantum Mechanics and Nuclear Structure <i>40 minutes</i>	Write about topics in chemistry that connect to daily life.
LESSON 3	
Nuclear Reactions: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Fission, Fusion, and Radioactive Decay: Study <i>45 minutes</i>	Learn about fission and fusion reactions, and about radioactive decay.
Fission, Fusion, and Radioactive Decay: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Half-life: Study <i>45 minutes</i>	Learn about half-lives and radioactive dating.
Half-life: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.

Lesson and Duration	Description
Practice: Energy in Electrons and Nuclei <i>1 hour</i>	Practice problem-solving skills related to concepts in the lesson.
LESSON 4 Doing Science: Quantum and Nuclear Chemistry: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Nuclear Power: Study <i>40 minutes</i>	Learn about the process of scientific inquiry.
Nuclear Power: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Lab: Radioactivity and Radiation <i>1 hour, 30 minutes</i>	Use the scientific method and scientific skills to perform a lab experiment.
Prepare to Discuss: Radioactivity and Radiation <i>5 minutes</i>	Prepare for a discussion.
Discuss: Radioactivity and Radiation <i>20 minutes</i>	Discuss the results of your lab.
UNIT 4 WRAP-UP Quantum and Nuclear Chemistry: Review <i>30 minutes</i>	Prepare for the unit test by reviewing key concepts and skills.
Posttest: Quantum and Nuclear Chemistry <i>1 hour</i>	Take a computer-scored test to assess what you have learned in this unit.

Lesson and Duration	Description
Teacher-Graded Posttest: Quantum and Nuclear Chemistry <i>1 hour</i>	Take a teacher-scored test to assess what you have learned in this unit.

UNIT 5: ENERGY IN ORGANIC MOLECULES

Lesson and Duration	Description
Pretest: Energy in Organic Molecules <i>40 minutes</i>	Complete the pretest (optional).
Energy in Organic Molecules: Unit Overview <i>1 minute</i>	Read the unit overview.
LESSON 1 Foundations of Organic Chemistry: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Carbon Compounds: Study <i>45 minutes</i>	Learn about why carbon atoms form a wide variety of molecules; learn about the general structure and importance of organic compounds.
Carbon Compounds: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Hydrocarbons: Study <i>45 minutes</i>	Learn about the naming of simple hydrocarbons.
Hydrocarbons: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.

Lesson and Duration	Description
LESSON 2 Introductory Biochemistry: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Functional Groups: Study <i>45 minutes</i>	Learn about the structures of the main functional groups on organic molecules.
Functional Groups: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Biological Molecules: Study <i>45 minutes</i>	Learn about the main biological macromolecules.
Biological Molecules: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Journal: Molecules in You <i>40 minutes</i>	Write about topics in chemistry that connect to daily life.
LESSON 3 Energy in the World: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Fossil Fuels: Study <i>45 minutes</i>	Learn about the chemistry of fossil fuels, and about the environmental issues connected to fossil fuels.
Fossil Fuels: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Alternative Fuels: Study <i>45 minutes</i>	Learn about biofuels, nuclear energy, and other alternative fuel sources.
Alternative Fuels: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.

Lesson and Duration	Description
Practice: Energy in Organic Molecules <i>1 hour</i>	Practice problem-solving skills related to concepts in the lesson.
Journal: You Decide <i>40 minutes</i>	Write about topics in chemistry that connect to daily life.
LESSON 4 Doing Science: Energy in Organic Molecules: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Prosthetic Engineering: Study <i>40 minutes</i>	Learn about the process of scientific inquiry.
Prosthetics: Mastery Test <i>20 minutes</i>	Take a quiz to assess your understanding of the material.
Lab: Molecular Models <i>1 hour, 30 minutes</i>	Use the scientific method and scientific skills to perform a lab experiment.
Prepare to Discuss: Molecular Models <i>5 minutes</i>	Prepare for a discussion.
Discuss: Molecular Models <i>20 minutes</i>	Discuss the results of your lab.
UNIT 5 WRAP-UP Energy in Organic Molecules: Review <i>30 minutes</i>	Prepare for the unit test by reviewing key concepts and skills.
Posttest: Energy in Organic Molecules <i>1 hour</i>	Take a computer-scored test to assess what you have learned in this unit.

Lesson and Duration	Description
Teacher-Graded Posttest: Energy in Organic Molecules <i>1 hour</i>	Take a teacher-scored test to assess what you have learned in this unit.

SEMESTER WRAP-UP

Lesson and Duration	Description
Semester Review: Review <i>1 hour</i>	Prepare for the semester exam by reviewing key concepts covered in this semester.
End-of-Semester Test: Semester Exam <i>1 hour</i>	Take a computer-scored exam to demonstrate your mastery of concepts and skills covered in this semester.
Teacher-Graded End-of-Semester Test: Semester Exam <i>1 hour</i>	Take a teacher-scored exam to demonstrate your mastery of concepts and skills covered in this semester.