

Course Title:	AP Chemistry
Grade(s):	11-12

Course Description
AP Chemistry is an advanced college-level course designed to provide exceptionally motivated students with the opportunity to earn college credit. It is a challenging, accelerated, and in-depth presentation of a broad range of topics discussed in Chemistry. This course is taught with both lecture and laboratory components. It requires extensive reading, independent work, and the ability to work on and learn many topics simultaneously. Students are expected to take the AP Chemistry examination in May through which they may gain academic credits or advanced standing at the college of their choice.
Approved Curricular Materials/Textbook(s)
Chemistry AP® Edition Update, 10th Edition ISBN-13: 9780357872680 © 2023 Steven S. Zumdahl, Donald J. DeCoste, Susan A. Zumdahl

Unit Title	Unit Description (Include Unit Objectives)	Unit Pacing
Unit 1: Atomic Structure and Properties	In Unit 1, students will learn how to use and create models that represent chemical ideas. They will practice building models and explaining whether these models match chemical theories. Students will also work on translating data into different forms, such as turning photoelectron spectroscopy (PES) results into electron configurations. Using tools like PES graphs, electron configurations, the periodic table, and drawings, students will explain atomic structure, which is the foundation for all later topics in chemistry. This unit also focuses on recognizing patterns in chemical behavior, like trends in atomic and molecular properties. Students will practice analyzing graphs and other data to identify patterns and relationships.	Summer assignment and early September
Unit 2: Chemical	In this unit, students will learn how to write and balance chemical equations. They	Mid-September to

Reactions	will identify different types of reactions, such as acid-base, redox, and precipitation, and use this knowledge to make predictions about reaction outcomes. Students will also use evidence from experiments and stoichiometry to support claims about the identity and amount of products formed. They will practice calculating how the amounts of products change when reactants are limited or in excess. Being able to represent reactions accurately and use stoichiometry to predict outcomes is a key skill that will be important throughout the rest of the course.	mid-October
Unit 3: Gases	In this unit, students will practice illustrating chemical ideas by drawing particle-level models of solids, liquids, gases, and solutions. They will also develop mathematical reasoning skills, which are essential for success in the rest of the course. Students will learn to explain how variables in an equation, like the ideal gas law, are related and estimate the value of one variable when another changes. They will practice these skills during experiments by making observations, collecting data, and choosing appropriate procedures. Students will also evaluate the accuracy and precision of their data and use mathematical equations to support their claims, such as calculating concentrations or understanding the properties of substances in mixtures.	Mid to late October
Unit 4: Kinetics	In Unit 4, students will learn how to construct and interpret rate laws based on experimental evidence. They will collect data using spectrophotometry and use mathematical methods to determine how concentration changes over time in a reaction. Students will also examine proposed reaction mechanisms to see if the predicted rate laws match experimental results. They will learn to identify intermediates, catalysts, and the rate-determining step, and support their conclusions with evidence. Additionally, students will construct and analyze energy profiles for reactions and understand how these profiles change when a catalyst is added.	November
Unit 5: Equilibrium	Building on skills from earlier units, students will learn to construct equilibrium expressions from chemical equations. They will create particle-level representations to show the dynamic nature of reactions, including the forward and reverse rates. Students will also make and interpret graphs that represent a system at equilibrium and connect these graphs to both their particle-level models and equilibrium expressions. Using experimental data, they will calculate the	December

	reaction quotient (Q) and the equilibrium constant (K). Finally, students will apply Le Châtelier's principle to predict and explain how a reaction shifts when stressed by changes in concentration, pressure, volume, or temperature.	
Unit 6: Acids and Bases	In Unit 6, students will apply the skills and calculations they learned in Unit 5 to acid-base equilibrium systems. They will collect titration data and create titration curves for different acid-base combinations. Students will analyze these curves to compare strong acid–strong base titrations with weak acid–strong base or weak base–strong acid titrations, identify equivalence points, half-equivalence points, and buffer regions. Using the curves, they will calculate equilibrium constants (K_a or K_b), determine the concentration of unknown solutions, and explain how buffers work when acids or bases are added. Finally, students will use their results to explain how possible sources of error may have affected their experiments and calculations.	Early January through early February (including midterms)
Unit 7: Thermodynamics	In Unit 7, students will focus on connecting particle-level and atomic-level behavior to what happens at the macroscopic level. They will learn to justify claims about the direction of energy transfer between a system and its surroundings during temperature changes, physical changes, or chemical reactions. Students will create diagrams to show energy transfer with arrows and use these representations to explain how changes in a system's energy are balanced by heat or work moving into or out of the system. This builds on their previous experience using models, equations, and reasoning to explain chemical phenomena.	Mid-February to early March
Unit 8: Electrochem	In Unit 8, students will build on their understanding of kinetics, thermodynamics, equilibrium, and electrochemistry to explain and support claims about chemical systems. They will sometimes estimate values rather than rely on routine calculations to analyze a system. Students will learn about entropy and how it helps explain why some endothermic reactions occur even when the products have higher energy. They will use particle-level models and graphs of kinetic energy to show how entropy increases with temperature. Students will also use Gibbs free energy to determine whether a reaction is thermodynamically favorable by considering both enthalpy and entropy changes. Finally, they will apply these thermodynamic concepts to make predictions and explanations about what happens in galvanic and electrolytic cells.	Early March through late March

Unit 9: Compound Structure and Properties	In this unit, students will learn to read simple graphs showing how potential energy changes as two atoms get closer, helping them understand why bonds form, why they have a certain length, or why they may not form at all. Students will also practice building models for chemical systems, like ionic and metallic solids, and use these models to make predictions or explain behavior. For example, they can use VSEPR theory to draw Lewis structures, predict molecular shapes, and determine polarity. Students will connect ideas across scales, explaining how atomic properties like electronegativity and ionization energy relate to bond type and macroscopic properties. They will also use concepts such as Coulomb's law, formal charge, and resonance to evaluate how well a model represents both particle-level structure and observable behavior. These skills will help students make stronger connections to prior units and make predictions about interparticle interactions, intermolecular forces, and macroscopic properties.	April
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