

Chemistry Semester 2 Course Syllabus

The Plano ISD eSchool Mission is to create a borderless classroom based on a positive student-teacher relationship that fosters independent, innovative critical thinking and empower students to thrive, contribute, and compete in a global society.

Course Number: 205002

Course Title: Chemistry Semester 2

Communications

All communication with your teacher will be through the utilization of electronic tools such as email and discussion boards. You will receive a Welcome email from your teacher when your course is ready for you. You may email your teacher at any time with questions that you might have.

Course Description

CompassLearning High School Chemistry was designed as a two-semester course for second- or third-year high school students. Chemistry topics include matter, the periodic table, chemical reactions, solution chemistry, organic chemistry, and nuclear chemistry. The course includes state-of-the-art animation and computer graphics to simplify concepts with visual explanations. Step-by-step instructions for solving quantitative chemistry and physics problems are provided throughout the course. CompassLearning High School science courses include strategies for dealing with common misconceptions, based on information gathered from Uncovering Student Ideas in Science by Page Keeley and Joyce Tugel, Project 2061, and the National Science Education Standards.

Course Objectives and Student Learning Outcomes

Upon successful completion of this course, the student will be able to:

- Study chemistry: what tools to use and how to manipulate and use scientific data
- Look at the primary patterns associated with chemistry: subatomic particles, numbers of atoms, the periodic table, and types of bonding
- Explore the language of chemistry, including naming substances, recognizing types of chemical reactions, and the law of conservation of mass in theory and numbers
- Explore the various states of matter and their associated laws, and changes in kinetic energy required to change a state or phase
- Investigate solutions and how the manipulation of various factors changes properties of solutions
- Investigate what makes chemical reactions occur, kinetic energy, reaction rates, and equilibrium needs, and apply these to real-life situations
- Investigate how hydrogen and carbon atoms combine to make molecules, as well as how other organic molecules
- Investigate nuclear chemistry, looking at radioactive decay and nuclear reactions

Course Materials

All course materials are available within the course. Chemistry Toolkit is available on the student launch pad. The toolkit includes:

- Calculator
- Periodic table
- Formula chart
- Conversion chart
- Physics reference charts
- Animations

Laboratory Activities

To provide a lab experience in an online setting, CompassLearning Chemistry offers a blend of simulations and hand-on activities.

Academic Integrity/Copyright Policy:

Academic integrity violations, plagiarism, and copyright violations will not be tolerated. The Introductory unit of your course will teach you the details of PISD's expectations on such topics. Your teacher will utilize plagiarism check tools throughout the course.

Online Etiquette ("Netiquette"):

Netiquette is meant to help you communicate professionally and effectively in an online collaborative setting. Students will follow all guidelines relating to internet etiquette and will communicate respectfully with all people. The Introductory unit of your course will teach you the details of PISD's expectations on such topics. Your course will contain discussion boards, journals, blogs and/or wikis where your "netiquette" is important.

Grading and Evaluation

Your grade will be calculated using the following scale:

90-100 = A

80-89 = B

60-79 = C

Below 70 – Not Passing

Assessments:

All courses contain a number of self-assessments (allowing the student to gauge their understanding of the material before proceeding to a graded assessment. Graded assessments include quizzes as well as exams. The student's school district (known as the receiving district), is required to prove proctors for major exams.

Class Participation:

Every student will have a specific schedule for completing and submitting assignments and tests. Students are required to adhere to their schedule. Students must maintain consistent email communication with their teacher. Students must complete the discussion assignments and collaborative activities throughout the course. Students who are not adhering to their course schedule, or students who are not maintaining the basic requirements of participation,

such as maintaining email communication with their teacher, may be dropped from the course.

Grading Scale:

90-100 = A

80-89 = B

60-79 = C

Below 70 – Not Passing

Drop Policy:

Students may choose to drop the course within 15 days from their start date without penalty. Notify your school's/district's site coordinator to have them indicate such a drop situation to TxVSN.

Unit	Course Content and Assignments
Chemical Reactions	<p>Unit Objective: Students will investigate what makes chemical reactions occur, including kinetic energy, reaction rates, and equilibrium needs, and apply to real-life situations</p> <p>Lessons:</p> <ul style="list-style-type: none"> • Reaction Energy and Particle Motion • Reaction Energy and Reaction Rate • Chemical Equilibrium • Oxidation-Reduction Reactions <p>Lab Assignments:</p> <ul style="list-style-type: none"> • Authentic Task: PHET Simulation: Reactions & Rates • Authentic Task: PhET Simulation: Reversible Reactions
Phases of Matter	<p>Unit Objective: Students will explore the various states of matter, associated laws, and changes in kinetic energy required to change the state or phase</p> <p>Lessons:</p> <ul style="list-style-type: none"> • Physical Characteristics of Gases • Gas Laws: Boyle's Law • Gas Laws: Charles's Law • Gas Laws: Gay-Lussac's Law • Gas Laws: Combined Gas Law • Ideal Gas Law • Molecular Composition of Gases • Liquids and Solids • Phase Changes <p>Lab Assignments:</p> <ul style="list-style-type: none"> • Authentic Task: PhET Simulation: Gas Properties • Authentic Task: PhET Simulation: States of Matter

Unit	Course Content and Assignments
Solutions and their Behavior	<p>Unit Objective: Students will investigate solutions and how the manipulation of various factors changes properties of solutions.</p> <p>Lessons:</p> <ul style="list-style-type: none"> • Introduction to Solutions • Working with Solutions • Concentration of Solutions • Ions in Aqueous Solutions • Colligative Properties of Solutions • Acids and Bases • Acid-Base Titration and pH <p>Lab Assignments:</p> <ul style="list-style-type: none"> • Authentic Task: PhET Simulation: Salts & Solubility • Authentic Task: PhET Simulation: Acid-Base Solutions • Authentic Task: PhET Simulation: pH Scale
Nuclear Chemistry	<p>Unit Objective: Students will investigate nuclear chemistry, looking at radioactive decay and nuclear reactions.</p> <p>Lessons:</p> <ul style="list-style-type: none"> • Nucleus • Radioactive Decay • Nuclear Reactions <p>Lab Assignments:</p> <ul style="list-style-type: none"> • Authentic Task: PhET Simulation: Isotopes and Atomic Mass • Authentic Task: PhET Simulation: Alpha Decay • Authentic Task: PhET Simulation: Beta Decay • Authentic Task: PhET Simulation: Radioactive Dating Game • Authentic Task: PhET Simulation: Nuclear Fission

§112.35. Chemistry, Beginning with School Year 2010-2011 (One Credit).

(a) General requirements. Students shall be awarded one credit for successful completion of this course. Required prerequisites: one unit of high school science and Algebra I. Suggested prerequisite: completion of or concurrent enrollment in a second year of math. This course is recommended for students in Grade 10, 11, or 12.

(b) Introduction.

(1) Chemistry. In Chemistry, students conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Students study a variety of topics that include characteristics of matter, use of the Periodic Table, development of atomic theory and chemical bonding, chemical stoichiometry, gas laws, solution chemistry, thermochemistry, and nuclear chemistry. Students will investigate how chemistry is an integral part of our daily lives.

(2) Nature of Science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.

(3) Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world. Scientific methods of investigation can be experimental, descriptive, or comparative. The method chosen should be appropriate to the question being asked.

(4) Science and social ethics. Scientific decision making is a way of answering questions about the natural world. Students should be able to distinguish between scientific decision-making methods and ethical and social decisions that involve the application of scientific information.

(5) Scientific systems. A system is a collection of cycles, structures, and processes that interact. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.

(c) Knowledge and skills.

TEKS	Bloom's Taxonomy	How / where addressed
(1) Scientific processes. The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:		
(A) demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers;	Understand	IP111 Lesson Quiz
(B) know specific hazards of chemical substances such as flammability, corrosiveness, and radioactivity as summarized on the Material Safety Data Sheets (MSDS); and	Understand	IP111 Lesson Quiz
(C) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.	Understand	IP111 Lesson Quiz BI1431 Lesson Quiz
(2) Science Processes. The student uses scientific methods to solve investigative questions.		
(A) know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;	Understand	IP121 AQIP121 BI111 AQB1111 BI112 AQB1112 Lesson Quiz
(B) know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;	Understand	BI111 AQB1111 BI112 AQB1112 IP121 AQIP121 IP122 AQIP122 IP124 AQIP124

TEKS	Bloom's Taxonomy	How / where addressed
(C) know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but may be subject to change as new areas of science and new technologies are developed;	Understand	BI111 AQBI111 IP124 AQIP124
(D) distinguish between scientific hypotheses and scientific theories;	Analyze	BI111 AQBI111 BI112 AQBI112 IP121 AQIP121 IP122 AQIP122 IP124 AQIP124
(E) plan and implement investigative procedures, including asking questions, formulating testable hypotheses, and selecting equipment and technology, including graphing calculators, computers and probes, sufficient scientific glassware such as beakers, Erlenmeyer flasks, pipettes, graduated cylinders, volumetric flasks, safety goggles, and burettes, electronic balances, and an adequate supply of consumable chemicals;	Evaluate	IP111 Lesson Quiz IP121 AQIP121 IP122 AQIP122 BI111 AQBI111 BI112 AQBI112 Lesson Quiz

TEKS	Bloom's Taxonomy	How / where addressed
(F) collect data and make measurements with accuracy and precision;	Evaluate	IP122 AQIP122 BI111 AQB1111 BI112 AQB1112 Lesson Quiz CH001 AQCH001
(G) express and manipulate chemical quantities using scientific conventions and mathematical procedures, including dimensional analysis, scientific notation, and significant figures;	Evaluate	CH003 Lesson Quiz CH004 Lesson Quiz
(H) organize, analyze, evaluate, make inferences, and predict trends from data; and	Evaluate	BI112 AQB1112 IP123 AQIP123 IP124 AQIP124
(I) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphs, journals, summaries, oral reports, and technology-based reports.	Apply	IP124 AQIP124 BI112 AQB1112
(3) Science Processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom.		

TEKS	Bloom's Taxonomy	How / where addressed
(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;	Evaluate	IP121 AQIP121 IP122 AQIP122 IP123 AQIP123 IP124 AQIP124 Lesson Quiz BI111 AQBI111 BI112 AQBI112 Lesson Quiz
(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;	Apply	IP124 AQIP124 BI112 AQBI112
(C) draw inferences based on data related to promotional materials for products and services;	Evaluate	IP124 AQIP124 BI112 AQBI112
(D) evaluate the impact of research on scientific thought, society, and the environment;	Evaluate	IP124 AQIP124 BI311 AQBI311 BI431 Lesson Quiz BI451 AQBI451 BI471 Lesson Quiz BI511 AQBI511
(E) describe the connection between chemistry and future careers; and	Apply	Not Available

TEKS	Bloom's Taxonomy	How / where addressed
(F) research and describe the history of chemistry and contributions of scientists.	Evaluate	CH005 AQCH005 CH007 AQCH007 CH013 AQCH013 CH016 AQCH016 CH025 Lesson Quiz CH042 AQCH042 CH063 AQCH063 CH073 AQCH073
(4) Science concepts. The student knows the characteristics of matter and can analyze the relationships between chemical and physical changes and properties.		
(A) differentiate between physical and chemical changes and properties;	Apply	CH019 AQCH019 CH024 Lesson Quiz CH052 AQCH052 CH061 AQCH061 CH062 AQCH062 Lesson Quiz CH079 AQCH079
(B) identify extensive and intensive properties;	Analyze	CH001 AQCH001 IP311 AQIP311 IP312 AQIP312 Lesson Quiz IP322 AQIP322

TEKS	Bloom's Taxonomy	How / where addressed
(C) compare solids, liquids, and gases in terms of compressibility, structure, shape, and volume; and	Analyze	CH037 AQCH037 CH038 AQCH038 Lesson Quiz CH039 CH040 CH046 AQCH046 CH047 AQCH047 Lesson Quiz CH048 AQCH048 CH049 AQCH049 CH050 AQCH050 CH051 AQCH051 CH052 AQCH052
(D) classify matter as pure substances or mixtures through investigation of their properties.	Analyze	IP611 AQIP611 IP1111 AQIP1111 IP1112 AQIP1112 IP1114 AQIP1114 CH054 Lesson Quiz CH061 AQCH061 CH062 AQCH062 Lesson Quiz
(5) Science concepts. The student understands the historical development of the Periodic Table and can apply its predictive power. The student is expected to:		
(A) explain the use of chemical and physical properties in the historical development of the Periodic Table;	Understand	CH013 AQCH013 CH014 AQCH014 CH015 AQCH015 Lesson Quiz

TEKS	Bloom's Taxonomy	How / where addressed
(B) use the Periodic Table to identify and explain the properties of chemical families, including alkali metals, alkaline earth metals, halogens, noble gases, and transition metals; and	Analyze	CH013 AQCH013 CH014 AQCH014 CH015 AQCH015 Lesson Quiz CH016 AQCH016
(C) use the Periodic Table to identify and explain periodic trends, including atomic and ionic radii, electronegativity, and ionization energy.	Analyze	CH013 AQCH013 CH014 AQCH014 CH015 AQCH015 Lesson Quiz
(6) Science concepts. The student knows and understands the historical development of atomic theory. The student is expected to:		
(A) understand the experimental design and conclusions used in the development of modern atomic theory, including Dalton's Postulates, Thomson's discovery of electron properties, Rutherford's nuclear atom, and Bohr's nuclear atom;	Analyze	CH005 AQCH005 CH007 AQCH007
(B) understand the electromagnetic spectrum and the mathematical relationships between energy, frequency, and wavelength of light;	Analyze	IP1811 AQIP1811 IP1812 AQIP1812 Lesson Quiz PH063 Lesson Quiz

TEKS	Bloom's Taxonomy	How / where addressed
	(C) calculate the wavelength, frequency, and energy of light using Planck's constant and the speed of light;	Analyze PH057 AQPH057 PH058 AQPH058 Lesson Quiz PH094 Lesson Quiz PH095 Lesson Quiz PH096 Lesson Quiz PH097 Lesson Quiz
	(D) use isotopic composition to calculate average atomic mass of an element; and	Analyze CH008 AQCH008 CH010 AQCH010 CH011 AQCH011 CH012 AQCH012 Lesson Quiz
	(E) express the arrangement of electrons in atoms through electron configurations and Lewis valence electron dot structures.	Analyze CH016 AQCH016 CH017 AQCH017 Lesson Quiz CH020 AQCH020 CH025 Lesson Quiz CH078 Lesson Quiz
(7) Science concepts. The student knows how atoms form ionic, metallic, and covalent bonds. The student is expected to:		
	(A) name ionic compounds containing main group or transition metals, covalent compounds, acids, and bases, using International Union of Pure and Applied Chemistry (IUPAC) nomenclature rules;	Understand CH022 AQCH022 CH023 AQCH023 CH026 Lesson Quiz CH063 AQCH063

TEKS	Bloom's Taxonomy	How / where addressed
(B) write the chemical formulas of common polyatomic ions, ionic compounds containing main group or transition metals, covalent compounds, acids, and bases;	Analyze	CH022 AQCH022 CH023 AQCH023 CH026 Lesson Quiz CH027 AQCH027 CH063 AQCH063 CH078 Lesson Quiz
(C) construct electron dot formulas to illustrate ionic and covalent bonds;	Analyze	CH016 AQCH016 CH017 AQCH017 Lesson Quiz CH018 AQCH018 CH019 AQCH019 Lesson Quiz CH020 AQCH020 CH025 Lesson Quiz
(D) describe the nature of metallic bonding and apply the theory to explain metallic properties such as thermal and electrical conductivity, malleability, and ductility; and	Evaluate	CH024 Lesson Quiz
(E) predict molecular structure for molecules with linear, trigonal planar, or tetrahedral electron pair geometries using Valence Shell Electron Pair Repulsion (VSEPR) theory.	Evaluate	CH025 Lesson Quiz
(8) Science concepts. The student can quantify the changes that occur during chemical reactions. The student is expected to:		

TEKS	Bloom's Taxonomy	How / where addressed
(A) define and use the concept of a mole;	Understand	CH010 AQCH010 CH011 AQCH011 CH012 AQCH012 Lesson Quiz
(B) use the mole concept to calculate the number of atoms, ions, or molecules in a sample of material;	Apply	CH033 AQCH033 CH034 AQCH034 CH035 AQCH035 CH036 AQCH036 Lesson Quiz
(C) calculate percent composition and empirical and molecular formulas;	Analyze	CH022 AQCH022 CH023 AQCH023 CH026 Lesson Quiz CH027 AQCH027 CH030 AQCH030
(D) use the law of conservation of mass to write and balance chemical equations; and	Analyze	CH031 AQCH031 CH035 AQCH035
(E) perform stoichiometric calculations, including determination of mass relationships between reactants and products, calculation of limiting reagents, and percent yield.	Apply	CH033 AQCH033 CH034 AQCH034 CH035 AQCH035 CH036 AQCH036 Lesson Quiz
(9) Science concepts. The student understands the principles of ideal gas behavior, kinetic molecular theory, and the conditions that influence the behavior of gases. The student is expected to:		

TEKS	Bloom's Taxonomy	How / where addressed
(A) describe and calculate the relations between volume, pressure, number of moles, and temperature for an ideal gas as described by Boyle's law, Charles' law, Avogadro's law, Dalton's law of partial pressure, and the ideal gas law;	Analyze	CH037 AQCH037 CH038 AQCH038 Lesson Quiz CH039 Lesson Quiz CH040 Lesson Quiz CH042 AQCH042 CH043 AQCH043 CH044 AQCH044 CH045 AQCH045 CH046 AQCH046 CH047 AQCH047 Lesson Quiz
(B) perform stoichiometric calculations, including determination of mass and volume relationships between reactants and products for reactions involving gases; and	Apply	CH033 AQCH033 CH034 AQCH034 CH035 AQCH035 CH036 AQCH036 Lesson Quiz
(C) describe the postulates of kinetic molecular theory.	Analyze	CH037 AQCH037 CH038 AQCH038 Lesson Quiz CH039 Lesson Quiz CH040 Lesson Quiz CH041 Lesson Quiz CH044 AQCH044 CH047 AQCH047
(10) Science concepts. The student understands and can apply the factors that influence the behavior of solutions. The student is expected to:		

TEKS	Bloom's Taxonomy	How / where addressed
(A) describe the unique role of water in chemical and biological systems;	Apply	CH025 Lesson Quiz CH048 AQCH048 CH049 AQCH049 CH055 AQCH055 CH056 AQCH056 Lesson Quiz CH059 AQCH059 CH060 AQCH060 Lesson Quiz
(B) develop and use general rules regarding solubility through investigations with aqueous solutions;	Analyze	CH055 AQCH055 CH056 AQCH056 Lesson Quiz CH059 AQCH059 CH060 AQCH060 Lesson Quiz CH061 AQCH061
(C) calculate the concentration of solutions in units of molarity;	Analyze	CH057 AQCH057 CH058 AQCH058 Lesson Quiz CH065 AQCH065 CH066 AQCH066 CH067 AQCH067 Lesson Quiz
(D) use molarity to calculate the dilutions of solutions;	Apply	CH057 AQCH057 CH058 AQCH058 Lesson Quiz

TEKS	Bloom's Taxonomy	How / where addressed
(E) distinguish between types of solutions such as electrolytes and nonelectrolytes and unsaturated, saturated, and supersaturated solutions;	Evaluate	CH055 AQCH055 CH056 AQCH056 Lesson Quiz CH057 AQCH057
(F) investigate factors that influence solubilities and rates of dissolution such as temperature, agitation, and surface area;	Evaluate	CH055 AQCH055 CH056 AQCH056 Lesson Quiz
(G) define acids and bases and distinguish between Arrhenius and Bronsted-Lowry definitions and predict products in acid base reactions that form water;	Analyze	CH063 AQCH063 CH064 AQCH064 Lesson Quiz
(H) understand and differentiate among acid-base reactions, precipitation reactions, and oxidation-reduction reactions;	Evaluate	CH063 AQCH063 CH075 AQCH075 CH076 AQCH076 CH077 AQCH077 Lesson Quiz
(I) define pH and use the hydrogen or hydroxide ion concentrations to calculate the pH of a solution; and	Apply	CH063 AQCH063 CH064 AQCH064 Lesson Quiz CH065 AQCH065 CH066 AQCH066 CH067 AQCH067 Lesson Quiz

TEKS	Bloom's Taxonomy	How / where addressed
(J) distinguish between degrees of dissociation for strong and weak acids and bases.	Analyze	CH063 AQCH063 CH064 AQCH064 Lesson Quiz CH066 AQCH066 CH067 AQCH067
(11) Science concepts. The student understands the energy changes that occur in chemical reactions. The student is expected to:		
(A) understand energy and its forms, including kinetic, potential, chemical, and thermal energies;	Analyze	IP1611 AQIP1611 IP1612 AQIP1612 IP1613 AQIP1613 Lesson Quiz IP2111 AQIP2111 CH006 AQ006 CH009 AQ009
(B) understand the law of conservation of energy and the processes of heat transfer;	Analyze	IP1613 AQIP1613 IP2121 AQIP2121 IP2122 AQIP2122 PH036 PH037 PH049 PH050 PH053 PH055 PH098

TEKS	Bloom's Taxonomy	How / where addressed
(C) use thermochemical equations to calculate energy changes that occur in chemical reactions and classify reactions as exothermic or endothermic;	Apply	CH006 AQCH006 CH009 AQCH009 CH068 AQCH068 Lesson Quiz CH071 AQCH071 CH072 AQCH072 CH073 AQCH073 CH074 AQCH074 Lesson Quiz
(D) perform calculations involving heat, mass, temperature change, and specific heat; and	Analyze	IP2122 AQIP2122 IP2123 AQIP2123 IP2124 AQIP2124 Lesson Quiz CH006 AQCH006 CH009 AQCH009
(E) use calorimetry to calculate the heat of a chemical process.	Apply	CH009 AQCH009 CH068 AQCH068
(12) Science concepts. The student understands the basic processes of nuclear chemistry. The student is expected to:		
(A) describe the characteristics of alpha, beta, and gamma radiation;	Understand	CH083 AQCH083 CH084 AQCH084 CH085 AQCH085 CH086 AQCH086 Lesson Quiz

TEKS	Bloom's Taxonomy	How / where addressed
(B) describe radioactive decay process in terms of balanced nuclear equations; and	Analyze	CH086 AQCH086 CH087 AQCH087 CH088 AQCH088 Lesson Quiz
(C) compare fission and fusion reactions.	Analyze	CH087 AQCH087 CH088 AQCH088 Lesson Quiz