Fairfax Collegiate
2026 Summer Program
Chem Workshop Course Syllabus
Rising Grades 4-6

Course Description

Mix chemicals and see what happens.

Make oobleck, launch pop rockets, build marble roller coasters, create density art, test pH, and experiment with elephant toothpaste and Coke and Mentos.

Investigate matter, atoms, energy, chemical reactions, density, and acids and bases.

Learn how scientists record data, look for patterns, and explore big questions.

Students strengthen their curiosity through hands-on experiments. In the course, students explore chemistry through experiments, group challenges, and creative activities. With clear guidance and plenty of chances to observe, test, and discover, students build confidence as young scientists.

By the end of the course, families receive photos and videos taken during the class showing their students' hands-on work. Students leave ready to explore science with greater curiosity and a deeper understanding of how chemistry shapes the world around them.

Learning Objectives

Course Goals	**The Scientific Method:** Students learn about the methods used by scientists to investigate chemistry concepts in the real world, including experimental design, controls and variables, inference and observation, and data recording. **Concepts of Chemistry:** Students learn about the core concepts of chemical science, such as states of matter and phase changes, heat, energy, acids, bases, atoms, chemical reactions, and energy. **Laboratory Science:** Students learn the procedures used to conduct laboratory experiments, especially including safety procedures. They also get to design and conduct their own experiments in the lab.

Course Topics	**Matter:** Students learn about matter and the different types of matter that are around us every day. **Phase Changes:** Students learn about what natural processes allow for matter to change into a different type of matter and how we can synthetically produce different types of matter. **Atoms:** Students learn about the composition of atoms and how they describe different elements in the periodic table. **Energy:** Students learn about different types of energy, including potential, kinetic, and thermal energy. Students complete activities and design processes to visualize and understand each type of energy. **Chemical Reactions:** Students observe and experiment with different chemical reactions. Students practice data recording, making scientific observations, and observe fascinating and unique reactions. **Density:** Students learn the role of density and complete challenges that help to determine the relative densities of different liquids using the scientific method. **Acids and Bases:** Students learn about the chemistry behind acids and bases and how they impact our environment, such as the impact of acid rain on ecosystems.

Course Schedule

Class Meeting 1	**Introduction and Icebreaker:** Students get a chance to learn each other's names and introduce themselves. **States of Matter Sorting:** Students arrange a given set of cards into categories to identify liquids, solids, and gases as the three categories of matter. **Lesson on Matter:** Students try to come up with their own definition of matter and learn relevant vocabulary. **States of Matter:** Students observe objects in multiple different state of matter. **Speed of Water:** Students explore the speed of water molecules in hot vs. cold water. **Matter Bingo:** Students test their knowledge on the terms and concepts relating to matter with a competitive game of bingo.
Class Meeting 2	**Lesson on Phase Changes:** Students learn about the different ways that matter can change phases. **Phase Change Activity:** Students demonstrate their knowledge of phase changes with a brief activity. **Oobleck:** Students learn about non-Newtonian fluids, and how they cross into different phases. **Create a Venn Diagram:** Students recollect all the information they've learned about matter and

	different phases by illustrating the differences and similarities through a Venn Diagram. **Make Your Own Snow Globe:** Students observe the changes in matter that occur when liquid glycerin alters the consistency of water.
Class Meeting 3	**Parts of an Atom:** Students use a model kit to learn and understand the different parts of an atom. **Atomic Structure Timeline:** Students learn about the history of atoms and the different models proposed by different scientists. **Chemdoku:** Students play a game of Sudoku with chemistry rules. **Periodic Play:** Students demonstrate their knowledge of atoms and the periodic table by creating a play performance for their classmates.
Class Meeting 4	**Element Word Find:** Students familiarize themselves with the different elements of the periodic table by playing a popular game. **Labeling the Periodic Table:** Students learn about the different groups on the periodic table. **Periodic Table Battleship:** Students practice using the information from the periodic table by playing a popular game. **Atomic Musical Chairs:** Students visualize the role of electrons and orbitals in an atom through playing musical chairs. **Build the Periodic Table:** Students explore an element of their choice by researching and building a model of the element.
Class Meeting 5	**Spool Racer:** Students learn about the concept of potential vs. kinetic energy through this activity. **Marble Roller Coasters:** Students use their knowledge of energy to create a roller coaster for a marble. **Potential Kinetic Track:** Students visualize the effects of potential and kinetic energy through this demonstration. **Homemade Thermometer:** Students observe thermal energy by creating their own thermometers. **Rube Goldberg:** Students practice using different types of energy to generate a circuit of simple machines that accomplish a certain task.
Class Meeting 6	**Lesson on Types of Reactions:** Students learn the various types of chemical reactions that can occur. **Chemical Reactions Activity:** Students demonstrate their knowledge of chemical reactions through an activity. **Baking Soda and Vinegar:** Students observe a fundamental chemical reaction between baking soda and vinegar. **Pop Rockets:** Students use chemical reactions to launch their own rockets. **Pop Rockets:** Students use chemical reactions to launch their own rockets.

	Coke and Mentos: Students practice using the scientific method to observe the effects of different variables on this chemical reaction.
Class Meeting 7	**Equilibrium of Chemical Reactions:** Students learn about the equilibrium of chemical equations. **Equilibrium With Paper Balls:** Students use a demonstration to observe the concept behind chemical equilibrium. **How Many Waldo's?:** Students play a game of Where's Waldo to demonstrate the conservation of elements throughout a reaction. **Elephant Toothpaste:** Students observe a fun chemical reaction that uses many different chemicals. **Identify the Chemical Reactions:** Students play with different chemical reactions to identify the four main types of observable reactions.
Class Meeting 8	**Lesson on Density:** Students learn the key concepts behind density. **Art Using Density:** Students use the relative densities of different liquids to create their own art. **Layering Liquids:** Students engage in a competition to determine the relative densities of several household liquids. **Build a Boat:** Students attempt to construct a boat that can float on water and hold as many marbles as possible without sinking. **SCUBA Diver:** Students use materials to make a neutrally buoyant SCUBA diver figure.
Class Meeting 9	**Acids and Bases:** Students observe the differences between acids and bases by observing the different colors produced by each. **Testing PH:** Students practice determining the pH of different household items. **Math of Acids and Bases:** Students learn the math behind determining the pH and the pOH of different solutions. **Acid Rain:** Students learn the implications of acid rain in the environment.
Class Meeting 10	**Red Cabbage Test:** Students determine the acidity/basicity of a common food. **The Scientific Method:** Students use the scientific method to come up with their own research question. **The Scientific Method:** Students use the scientific method to come up with their own research question. **Final Review:** Students demonstrate the knowledge they learned in the course with a final review game.