URBANDALE
COMMUNITY SCHOOL DISTRICT

Course Title:	**Chemistry**
Description: This two-semester course is designed to meet the needs of the student who wants to go on to a four year university. The course will focus on the modern concepts of chemistry and on using problem solving effectively. Some topics investigated include atomic structure, periodic law, chemical bonds, chemical composition, chemical equations, gas laws, solution process, acid and bases, and science/society issues pertaining to chemistry. A student must pass the first semester to enroll in the second semester.	

Physical Sciences

Reporting Topic	Grade Level Standards	Competency Statement
Periodic Table	• Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. (HS-PS 1-1)	Students will use the periodic table to predict properties of elements.
Chemical Reactions	• Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. (HS-PS 1-2)	Students will use the periodic table to predict the outcome of a chemical reaction.
Molecular Forces	• Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. (HS-PS 1-3)	Students will compare the forces between atoms and compounds.
Kinetics	• Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. (HS-PS 1-5)	Students will explain the effects of temperature and concentration on the rate of a reaction.
Equilibrium	• Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium. (HS-PS 1-6)	Students will refine a chemical system to

		maximize the products at equilibrium.
Stoichiometry	• Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. (HS-PS 1-7)	Students will explain how matter is conserved in a reaction.
Nuclear Chemistry	• Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. (HS-PS 1-8) • Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. (HS-ETS1-1)	Students will illustrate how the nucleus of an atom changes during nuclear decay and the use of nuclear energy in society.
Thermodynamics	• Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. (HS-PS 1-4) • Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects) (HS-PS 3-2) • Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperatures are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics). (HS-PS 3-4)	Students will investigate how thermal energy will move within a system and illustrate the change in energy of a chemical reaction system.