To be academically competitive in this course, a student should be able to do the following prior to the start of the course: (Objectives are listed by general topic area.)

Basic Math
1. Utilize basic math and algebra functions to solve calculations, including calculations involving fractions, exponents, and scientific notation.
2. Determine information from a graph and construct a graph given data.
3. Convert numbers from one unit of measurement to another; for example, convert meters to inches or cm^3 to liters.
4. Understand the concept of significant digits and be able to correctly identify the number of significant digits to be used in a measurement or to be reported at the end of a calculation.
5. Understand and be able to use logarithms.
6. Estimate volumes of cylindrical, spherical, and rectangular prism objects.

Matter
1. Calculate density from a given mass and volume.
2. Use density to determine mass or volume.
3. Distinguish between elements, compounds, homogeneous mixtures, and heterogeneous mixtures.
4. Discuss the difference between chemical and physical properties and give examples of each.
5. Discuss the difference between chemical and physical changes and give examples of each.
6. Describe the differences between solid, liquid, and gas samples of a pure substance.
7. Know the names and symbols of common elements (H, C, N, O, F, Na, Mg, P, S, Cl, K, Ca, Br, I, Fe, Cu)

Atomic Structure
1. Understand the basic organization of the periodic table: describe the difference between groups and periods, use the table to determine atomic mass and atomic number, find elements with similar properties based on location within the table.
2. Identify the parts of an atom and the number of protons and electrons in atoms and ions.
3. Determine the number of valence electrons in a particular representative element.
4. Predict the charge of ions formed by representative elements.
5. Define isotope.
6. Determine relative electronegativities of elements based on the periodic trend.

Compounds
1. Predict whether a compound is covalent or ionic.
2. Name binary covalent and ionic compounds.
3. Write the formula for binary covalent or ionic compounds given the name.
4. Know the names and formula of common polyatomic ions. (carbonate, sulfate, nitrate, phosphate, ammonium)
5. Determine the formula of ionic compounds that incorporate polyatomic ions.
6. Determine the charge on ions given the molecular or empirical formula for a compound.

7. Predict polarity of bonds within molecules.
8. Given a Lewis dot structure, be able to count the number of bonding and non-bonding pairs of electrons.

Stoichiometry
1. Use Avogadro's number to convert from moles to particles.
2. Calculate the molar mass of a compound.
3. Write a chemical equation from a written description of a reaction.
4. Balance chemical equations.
5. Utilize a chemical equation to calculate the grams of reactant needed for a reaction or the grams of a product produced in a reaction.
6. Determining the mass of product produced given the starting amount of two or more reactants. (Solve a limiting reactant problem.)
7. Determine percent yield of a reaction given an actual yield and information about the amount of starting materials; Determine the actual yield given percent yield and amount of starting materials.

Solution Chemistry
1. Calculate molarity given moles (or mass) and volume
2. Use molarity to determine solute mass or solution volume.
3. Solve dilution problems – determine the amount of solvent needed to dilute to a particular molarity or determine the new molarity when a solution is diluted.
4. Predict the products of a dissolution.

Acid-Base Reactions
1. Identify combination, decomposition, displacement, combustion, precipitation, and acid-base reactions.
2. Identify acids and bases by their chemical formula and by their reaction with water.
3. Determine conjugate acids and bases.
4. Write the equation for a neutralization reaction.
5. Write the equation for the reaction of a strong acid with water.