CHEM 101 Introductory Chemistry

This course will provide students with a comprehensive overview of the major areas of chemistry. Chemical principles for each topic under discussion are presented together with their foundation in atomic and molecular structure. Topics covered range from atomic theory to the descriptions of chemical reactivity and reactions, quantitative methods in chemistry, reactions in aqueous media and chemical kinetics and chemical equilibrium. Applications of chemistry, "the central science" are discussed throughout the lectures. Lectures, quizzes, homework, and worksheet problems give students the opportunity to practice their knowledge, and to gain experience in problem solving. Upon completion of the course the student will have gained a strong foundation for the further study of chemistry, and for the application of chemical principles in a variety of other fields.
(Pre-requisites: High School Chemistry and Pre-Algebra)

Course Learning Outcomes:

By the end of the course, students will be able to:

1. Define the structure of the atom in terms of the nucleus with protons and neutrons, and electrons. Write and balance chemical equations, name inorganic compounds and ions and describe the properties of the main group elements. Understand the concept of oxidation-reduction, calculate oxidation numbers, and balance redox reactions.
2. To relate to the main theories and concepts behind chemical equilibrium and chemical reactions to simple real-life situations.
3. To carry out chemical calculations, including mass relations in chemical reactions, limiting reagent and reaction yield calculations, and calculations involving reactions taking place in solution.
4. Apply the fundamental laws of chemistry. Solve different problems in inorganic chemistry. Relate environmental with their chemical properties
5. Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment,

Textbook & Course Materials:

- R. Chang and K. Goldsby, "Chemistry" 13th edition.

Course Content:

1. Measurements
2. Handling numbers
3. Dimensional analysis in solving problems
4. Atomic Number, Mass Numbers, and Isotopes.
5. Periodic Table
6. Molecules & Ions

7. Chemical Formulas
8. Naming compounds
9. Atomic Mass
10. Avogadro's Mass and Molar Mass of an element
11. Molecular Mass
12. Mass Spectrometer
13. Percent Composition of Compounds
14. Experimental Determination of Empirical Formula
15. Chemical Reactions and Chemical Equations
16. Amounts of Reactants & Products
17. Limiting Reagents Calculations
18. Reaction Yield
19. Avogadro's Mass and Molar Mass of an element
20. General Properties of Aqueous Solutions
21. Precipitation Reactions
22. Acid-Base Titrations
23. Oxidation/Reduction Reactions
24. Concentration of Solutions
25. Gravimetric Analysis
26. Acid/Base Titrations
27. Redox Titrations
28. The Rate of Reaction
29. The Rate Law
30. The Relation between Reactant Concentration and Time
31. Activity Energy and Temperature Dependence of Rate Constants.
32. The Concept of Equilibrium and the Equilibrium Constant
33. Writing Equilibrium Constant Expressions
34. The Relation between Chemical Kinetics and Chemical
35. Equilibrium
36. Factors that affect Chemical Equilibrium