**CHEMISTRY COURSE MISSION and OUTCOMES STATEMENT**

**CHEMISTRY 251**

Students in this course will:

* learn the descriptive chemistry of representative elements of s- and p-block elements and recognize the differences in their reactivity, chemical and physical properties
* learn the occurrence of these elements in nature, their extraction and some industrial applications as well as the essentiality of some of these elements for life
* understand in more depth the atomic structure and shortcut of the electronic configuration, general trends within the periodic table, molecular structure and bonding, structure of metallic and simple ionic solids
* know an overall view for the atomic structure, atomic orbitals and the skeleton of the Periodic Table
* distinguish between the general trends within the periodic table (atomic and ionic sizes, ionization energy, electron affinity and electronegativity and the different scales for its measurements) including the variations within each group
* understand the different theories of bonding (Valence Shell Electron Pair Repulsion, Valence Bond and Molecular Orbital Theories
* compare and contrast between the differences in the chemical behavior of the compounds formed by these elements, bond angles and bond distances in molecular compounds and their magnetic properties based on their electronic natures
* recognize the differences between simple ionic solids and metals (lattice structure & lattice energy) and their stabilities based on Born Haber cycle
* learn about Band Theory of solids and differences between their electrical conductivities and different types of semiconductors
* understand how the temperature is affecting the behavior of metals and semiconductors in different ways
* recognize the theories of acids-bases with emphasize on hard-soft-acid-base (HSAB)
* predict and distinguish between stabilities of binary compounds
* recognize the chemistry of representative elements: their natural abundance, occurrence, electronic configuration, physical and chemical behaviors, their important compounds, chemical reactions (formation of halides, oxides, hydroxides, oxoacids, oxoanions, electron deficiency in group **13** and the formation of polymeric inorganic compounds in groups **14** and **15**), extraction of important elements and industrial applications of the elements and their compounds
* understand a systematic approach of leaning groups **1 (alkali metals)**, **2 (alkaline earth metals)**, **13-16, 17 (halogens) and 18 (noble gases)**, as well as the location of hydrogen in the Periodic Table all the groups will be covered in details
* explain, predict and distinguish between the chemical reactivity of these elements, the ionic and molecular compounds (molecular shapes, bond angles and bond lengths)
* learn about the essentiality of some of these elements for life and what kind of disease may result for their deficiencies in biological systems
* enhance their understanding for their industrial applications and biological importance