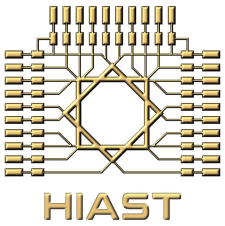
Syrian Arab Republic

Higher Institute for Applied Sciences and Technology



Course Specification Document

Title	General Chemistry

Credits	2.5 ECTS

Aims	This course aims to deepen the fundamental concepts in chemistry that help the student to understand the structure of matter starting from atomic structure, building the periodic table, molecules and their geometry and ultimately the study of the structure of condensed matter. This contributes to his/her subsequent study in chemistry and engineering sciences.

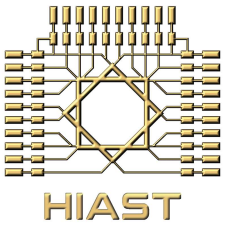
Intended learning outcomes

On successful completion of this course, the student will be able to:

- Understand the development of atomic structure theories.
- Comprehend the theories and concepts related to the interpretation of physical and chemical phenomena.
- Grasp the basic principles of crystallography.
- Write molecular formulas and deduce their spatial structures.
- Write the electron configuration of atoms in orbitals.
- Utilize the periodic table of elements and infer the fundamental properties of a given element.
- Draw crystal structures in two-dimensional and three-dimensional space..

Syllabus

- **Atomic structure:** Previous models, limitations of classical mechanics, the quantum model and Schrödinger equation and the rules of electron configuration.
- **Periodic table of elements:** The periodicity of properties and the study of some famous groups of elements.
- **Bonding:** Polyatomic molecules and ions, bond energy, bond length, covalent radius and molecular geometry.
- **Lewis model:** Valence electrons and electron dot notation, pure covalent bond and coordinate covalent bond, formal charge, the octet rule, bonding electrons, non-bonding electrons, multiple bonds and resonance
- **Intermolecular forces:** Vander Waals forces, interactions between ions, between ions and polar molecules, between polar molecules, between polar and nonpolar molecules, scattering forces and hydrogen bonding.
- **Dissolution and solvents:** Solvent properties, substance dissolution, solubility and miscibility, electrical properties of solvents.



- **Solvent applications:** Extraction, crystallization and thin-layer chromatography.
- **Structure of crystals:** Basic concepts (crystalline and amorphous matter, crystal lattices and lattice models, volumetric mass, lattice planes and Bragg's law, cohesion energy and classification of crystals by bonds, coordination number, packing, crystal sites). Crystal structures (simple cubic structure, close-packed structure, non-close-packed structure, graphite structure, zinc blende structure and metallic alloys).