

CHEM1.1: GENERAL CHEMISTRY I

I. Course description:

1. **Credit points:** 3 ECTS

2. **Time commitment:**

Items	Lecture	Tutorial	Practical	Total
No. of hours	22	12	0	34

3. **Prerequisites:** High-school Chemistry

4. **Recommended background knowledge:** N/A

5. **Subject description:**

The General Chemistry I course provides fundamental knowledge on chemical composition and structure of matters.

6. **Objectives & Outcome:**

The students will learn the following concepts:

- Critical role of chemistry in modern fundamental and applied sciences, specially those are currently proposed at USTH.
- Electronic structure of atoms
- Periodic properties of elements
- Chemical bonds
- Structure of molecules and materials

7. **Assessment/ Evaluation**

Component	Attendance + Homeworks	Exercises	Assignments	Practical	Midterm	Final
Percentage %	10	0	Bonus up to 10% based on performance in TD section	0	40	50

8. **Prescribed Textbook(s):**

[1] Brown, LeMay, Bursten, Murphy, Woodward, Stoltzfus, Chemistry: The Central Science, 2015, 13th Edition, Pearson Education.

[2] Petrucci, Herring, Madura, Bissonnette, General Chemistry: Principles and Modern Application, 2011, 10th Edition, Pearson Canada

II. Course content & schedule:

1. Introduction: Role of chemistry in modern sciences (with focus on those are currently proposed at USTH)
2. Matter and Measurement
 - + Classification of matter
 - + Physical and chemical changes, separation of mixtures
 - + Units of measurement
3. Atoms
 - + The atomic theory of Matter
 - + The discovery of Atomic structure
 - + The modern view of atomic structure (atomic number, mass, isotopes)
4. Electronic structure of atoms
 - + The wave nature of light
 - + Quantized energy and photons
 - + Line spectra and the Bohr model
 - + Quantum mechanics and atomic orbitals
 - + Representations of orbitals
 - + Many electron atoms
 - + Electron configurations
 - + Electron configurations and the periodic table
5. Periodic properties of the elements
 - + Development of the periodic table
 - + Effective nuclear charge
 - + Sizes of Atoms and Ions
 - + Ionization energy
 - + Electron affinity
6. Basic concepts of chemical bonding

- + Lewis symbols and the octet rule
 - + Ionic bonding
 - + Covalent bonding
 - + Bond polarity and electronegative
 - + Drawing Lewis structure
 - + Resonance structure
 - + Exception of the octet rule
 - + Strength and Lengths of covalent bonds
7. Molecular geometry and bonding theories
- + Molecular shapes
 - + VSEPR Model
 - + Molecular shape and molecular polarity
 - + Covalent bonding and orbital overlap
 - + Hybrid orbitals
 - + Multiple bonds
 - + Molecular orbitals
8. Chemical reaction
- + Theory of solutions and Solubility Rules
 - + Molecular and Ionic equations
 - + Types of chemical reactions : Precipitations; acid-base reactions; Oxidation – Reduction reactions
 - + Working with solution: Molar concentration; Diluting solution
 - + Quantitative analysis: Gravimetric analysis; Volumetric analysis

III. Reference Literature: N/A