Syllabus from Chemistry

1. Nature of chemistry (matter, mass and weight, substances and mixtures);
2. Atoms, molecules and ions (naming of elements, inorganic and coordination compounds);
3. Atomic structure and periodic table (atomic number, mass number, Bohr´s theory of the atom, isotopes, radioactivity, properties of elements – i.g. main group elements IA-VIIA, metals);
4. Bonding – general concepts (types of bonding, orbitals, hybridization);
5. Physical chemistry (chemical kinetics, chemical equilibrium, spontaneity, entropy, enthalpy and free energy, thermochemistry, thermodynamics);
6. Liquids and solids (electrochemistry, properties of solution, stoichiometry, colloid solutions);
7. Acids and bases (Arrhenius theory, Brönsted-Lowry theory, Lewis theory, strengths of acids and bases, salts hydrolysis, buffer solutions);
8. Reactions (types of reactions, oxidation numbers, balancing of redox equations, oxidizing and reducing agents);
9. Calculations (e.g. stoichiometric, concentration of solutions, pH, thermodynamic)
10. Hydrocarbons (IUPAC nomenclature, special properties of carbon, alkanes, alkenes and alkynes series, aromatic hydrocarbons, reactions of hydrocarbons);
11. Derivatives of hydrocarbons (nomenclature, alkyl - halides, alcohols, phenols, quinones, ethers, aldehydes, ketones, carboxylic acids, carboxylic acid derivatives, amines, thiols);
12. Heterocyclic compounds (nomenclature, nonaromatic heterocycles, aromatic heterocycles, five and six- membered ring containing heterocycles with one and more heteroatom(s), heterocycle derivatives);
13. Saccharides (monosaccharides, disaccharides and polysaccharides);
14. Lipids (simple and complex lipids, fatty acids, waxes, phospholipids, isoprenoids, terpenes and steroids);
15. Amino acids, peptides and proteins (structure of amino acids, acid-base properties, peptide bond, four levels of protein structure);
16. Nucleic acids (purine and pyrimidine bases, nucleosides, nucleotides, polynucleotides and their conformation, DNA, RNA - structure, genetic code, major types of RNA);
17. Biochemistry (chemical and biological properties of vitamins and hormones).