**Subjects of the entrance test**

**CHEMISTRY**

1. *General chemistry*
   1. Material systems and their classification.
   2. Structure of atoms, molecules.
      1. Atomic models, quantum mechanical atomic description, periodic table theory.
      2. Chemical bonding: ionic bonding; metallic bonding; covalent bonding; molecular orbits, band theory, molecular geometry.
      3. Transition between bond types. Sets, equations of state, laws of mixtures, dilute solutions.
   3. Radioactivity
   4. Basics of chemical thermodynamics
      1. Heat conditions, affinity. Law of mass action, equilibria.
      2. Acid-base theories: pH (strong base and acids)
      3. Electrochemistry: conductivity and dissociation, electrode potential, galvanic elements, redox systems and redox potential, electrolysis. Corrosion.
2. *Inorganic chemistry*
   * 1. General characterization of the elements.
     2. Chemical description of non-metallic elements, semi-metals, metals (s,d,f,p-field).
     3. General characterization and classification of compounds.
        1. Chemical description of the most important groups of compounds: halides, hydrides, oxides, hydroxides and oxoacids, salts of oxoacids, fertilizer active substances: nitrates, phosphates, silicic acids, and silicates.
3. *Organic chemistry*
   1. Hydrocarbons (saturated and unsaturated)
   2. Derivatives of hydrocarbons with different functional groups
      1. Alcohols
      2. Aromatic hydroxy compounds
      3. Aldehydes
      4. Ketones
      5. Carboxylic acids
      6. Derivatives of carboxylic acids
      7. Optical isomerism
      8. Esters
      9. Oxygen-containing compounds
      10. Sulphur-containing compounds
      11. Nitrogen-containing compounds
      12. Amides
      13. Nitro compounds
   3. Organic compounds in living organisms
      1. Amino acids
      2. Proteins
      3. Carbohydrates
      4. Nucleic acids (RNA, DNA)