Speciality "General Medicine"

ACADEMIC DISCIPLINE "MEDICAL CHEMISTRY"
CHEMICAL MODULE

Academic discipline outline	Elements of chemical thermodynamics, chemical kinetics. Volumetric analysis. Theory of redox tractions. Electrode and reduction potentials. Nernst equation. Galvanic cells. Doctrine of solutions. Solubility of substances in water and its dependence on various factors. Henry's law, Sechenov's equation. Heterogeneous equilibria. Conditions for formation of precipitates. Colligative properties of solutions. Raoult's laws. Osmotic pressure. Van't Hoff equation. Hypo-, hyper- and isotonic solutions in medical practice. Elements of theories of solutions of weak and strong electrolytes. Acid-base equilibrium. Buffer systems, pH calculation. Complex compounds, equilibrium in solutions of complex compounds. Physico-chemistry of surface phenomena. Surfactants. Solid adsorbents. Physico-chemistry of dispersed systems and solutions of high-molecular compounds. Stability of colloidal-dispersed systems.
Resulting skills	Advanced professional skills. To use knowledge of modern chemical and physicochemical methods of analysis of biological fluids, solutions of medicinal substances and biopolymers to perform calculations based on the research conducted.
Learning outcomes	A student must: **know:** fundamentals of acid-base balance of blood (blood pH, acidosis, alkalosis); mechanism of action of hydrocarbonate buffer system of blood plasma and hemoglobin buffer system of erythrocytes; hypo-, hyper-, and isotonic solutions and their application in biology and medicine; main components determining osmotic and oncotic pressure of blood plasma; water distribution between cells and extracellular fluid (hemolysis, plasmolysis); water distribution between vascular bed and intercellular space; gas solubility in blood: features of dissolution of oxygen, carbon dioxide and nitrogen in blood (hyperbaric oxygenation, caisson disease); chemical principles of bone mineralization and prevention of demineralization in calcium- and phosphate-deficient conditions of human body (rickets, pregnancy);

	chemical principles of stone formation and dissolution in urolithiasis and cholelithiasis; physicochemical principles of using porous adsorbents in hemo-, plasma-, lymphosorption and enterosorbents for extraction of radionuclides from human body in cases of poisoning; **be able to:** predict direction and depth of biochemical processes using thermodynamic calculations; prepare of solutions of given composition; analyze composition and physicochemical properties of biological fluids; reasonably select buffer solution with required pH and buffer capacity for laboratory research; **master:** method for preparing solution of given composition; method for molecular and macromolecular docking; method for determining order of chemical reaction; method for performing titration analysis.
Semester(s)	1 semester
Prerequisite	Chemistry (school course)
Credit value	3 credits
Academic hours	90 academic hours, of which: 44 class hours
Forms of midterm attestation	Credit