

AMENDMENTS TO THE CURRICULUM IN THE ACADEMIC DISCIPLINE

«Medical Chemistry»
for the specialty 7-07-0911-03 «Dentistry»
for the 2024/2025 academic year

Amendments	Basis
1. Changes have been made to the explanatory note according to the Appendix № 1	Educational plan of the institution for the 2024-2025 academic year
2. Changes have been made to the thematic plan according to the Appendix № 2	Educational plan of the institution for the 2024-2025 academic year
3. Changes have been made to the educational map according to the Appendix № 3	Educational plan of the institution for the 2024-2025 academic year
4. The list of practical skills has been updated according to the Appendix № 4	The meeting of the Department of General Chemistry dated 22.05.2024
5. The list of regulatory legal acts has been updated according to the Appendix № 5	The meeting of the Department of General Chemistry dated 22.05.2024

The curriculum was revised and approved by the Department of *General Chemistry* (protocol № 6 of 22.05.2024).

Head of the Department of General Chemistry

Khrustalev V.V.

APPROVED

by Dean of the Medical Faculty for International Students

Ishutin O.S.

Changes in the explanatory note

Total number of hours for the study of the discipline is 94 academic hours. Classroom hours according to the types of studies: lectures – 9 hours (including 3 hours of supervised student independent work), laboratory studies 54 hours, student independent work (self-study) – 31 hours.

DISTRIBUTION OF STUDY TIME BUDGET BY SEMESTER

Code, specialty name	semester	The number of hours for the study of the discipline						Intermediate assessment
		total	classroom	including			student independent work	
				lectures	supervised student independent work	laboratory studies		
7-07-0911-03 Dentistry	1	94	63	9	3	54	31	credit

THEMATIC PLAN

Section (topic) name	Number of classroom hours	
	Lectures (incl. supervised student independent work)	Laboratory studies
1. The aim and purposes of Medical Chemistry	–	3
2. Introduction to the coordination chemistry	–	3
3. Chemical thermodynamics and bioenergetics	1.5	3
3.1. Chemical thermodynamics as the basis of medical chemistry	1.0	–
3.2. Thermochemistry	–	2
3.3. Direction of biochemical processes	–	1
3.4. Thermodynamics of chemical equilibrium	0.5	–
4. Chemical kinetics and catalysis	1.5	3
4.1. Elements of chemical kinetics	1.0	2
4.2. Catalysis and catalysts	0.5	1
5. Doctrine on water solutions	1.5	21
5.1. Colligative properties of solutions	–	3
5.2. The theory of solutions of weak and strong electrolytes	–	1
5.3. Protolytic theory of acids and bases	–	2
5.4. Buffer solutions and systems	–	3
5.5. Titrimetric methods of analysis	–	3
5.6. Electrode and redox potentials	–	1
5.7. Galvanic cells	–	1
5.8. Potentiometry	–	1
5.9. Conductometry	–	3
5.10. Heterogeneous equilibria in the oral cavity	1.5	3
6. Physical chemistry of surface phenomena	1.5	6
6.1. Surface phenomena	–	1
6.2. Theories of adsorption	0.5	2
6.3. Chromatography	1.0	3
7. Physical chemistry of dispersed systems and solutions of biopolymers	3.0	9
7.1. Dispersed systems	1.5	6

Section (topic) name	Number of classroom hours	
	Lectures (incl. supervised student independent work)	Laboratory studies
7.2. Solutions of biopolymers	1.5	3
8. Chemistry of biogenic elements	–	6
8.1. Structure of tooth enamel, processes of mineralization, demineralization, and remineralization	–	3
8.2. Chemical structure of materials used in dentistry	–	3
Total hours	9	54

**EDUCATIONAL CURRICULAR CHART OF THE ACADEMIC DISCIPLINE «MEDICAL CHEMISTRY» OF
THE MODULE «CHEMICAL MODULE»**

Section, topic #	Section (topic) name	Number of classroom hours		supervised student independent work	Practical skill	Forms of control	
		lectures	laboratory			practical skill	current / intermediate assessment
1 st semester							
Lectures							
1	Chemical thermodynamics as the basis of medical chemistry. The usage of the apparatus of thermodynamics of chemical equilibrium in molecular and macromolecular docking.	1.5					
2	Elements of chemical kinetics: the order of the reaction, the half-elimination period, kinetic method for the determination of enzyme activity in blood serum. Theory of active collisions. Theory of transition state complex.	1.5					
3	Heterogeneous equilibria in human organism during its normal functioning and in pathology.	1.5					
4	Theories of adsorption, the usage of chromatographic methods of analysis in medicine and dentistry	1.5					
5	Dispersed systems, basics of colloid chemistry			1.5			Report defence*
6	Physical chemistry of biopolymer solutions			1.5			Report defence*

Laboratory studies									
1	The aim and purposes of medical chemistry. L.w. «Obtaining skills of the work with volumetric glassware».			3					Laboratory work, Control work
2	Introduction to the coordination chemistry. L.w. «Production of complex compounds».			3					Laboratory work, Control work
3	Thermochemistry. Direction of biochemical processes. The use of the apparatus of thermodynamics of chemical equilibrium in molecular and macromolecular docking. L.w. «Determination of the heat effect of neutralization reaction». L.w. «Molecular docking».			3			Determination of the inhibitory constant with the help of molecular docking.	Laboratory work	Laboratory work, Control work
4	Elements of chemical kinetics. Catalysis and catalysts. L.w. «The study of the dependence of the rate of chemical reaction on concentration of reactants»			3					Laboratory work, Control work
5	Colligative properties of solutions. Doctrine on water solutions. L.w. «Hemolysis of red blood cells in hypotonic solution».			3					Laboratory work, Control work
6	The theory of solutions of weak and strong electrolytes. Protolytic theory of acids and bases. L.w. «The measurement of active acidity of biological fluids».			3					Laboratory work, Control work
7	Buffer solutions and systems. L.w. «Preparation of buffer solutions and investigation of the mechanism of buffering action».			3			Measurement of pH with a help of colorimetric and potentiometric methods.	Laboratory work	Laboratory work, Control work
8	Titrimetric methods of analysis. L.w. «Standardization of a titrant (HCl solution) with a solution of primary standard».			3			Preparation of a solution of a given volume with a specific concentration. Estimation of concentration of a substance in a solution with a help of titrimetric analysis. Estimation of overall,	Laboratory work	Laboratory work, Control work

					active and potential acidity of biological fluids.			
9	Electrode and redox potentials. Potentiometry. Galvanic elements. L.w. «Potentiometric determination of the dissociation constant for a weak electrolyte».		3					Laboratory work, Control work
10	Conductometry. L.w. «Conductometric determination of the dissociation constant for a weak electrolyte».		3					Laboratory work, Control work
11	Heterogeneous equilibria in the oral cavity. L.w. «Preparation of heterogeneous systems «precipitate-solution» and the shift of equilibrium in those systems»		3					Laboratory work, Control work
12	Surface phenomena. Theories of adsorption. L.w. «The dependence of surface tension of a solution on the length of hydrocarbon chain of surface-active substances»		3					Laboratory work, Control work
13	Chromatography. L.w. «Analysis of chromatograms and mass-spectra».		3					Laboratory work, Control work
14	Dispersed systems. Introduction to colloid chemistry. L.w. «Preparation of colloid solutions with a method of condensation and investigation of their optical properties».		3					Laboratory work, Control work
15	Dispersed systems. Colloid and coarsely dispersed systems in medicine. L.w. «Stability of colloid solutions».		3					Laboratory work, Control work
16	Solutions of biopolymers. Physical and chemical properties of biopolymers. L.w. «Determination of the swelling degree of gelatin at different pH values». L.w. «Salting gelatin out».		3		Measurement of pH in isoelectric point of a biopolymer in water solution.	Laboratory work		Laboratory work, Control work
17	Structure of tooth enamel, processes of mineralization, demineralization, and remineralization.		3		Application of knowledge about the chemical structure of hydroxyapatite and fluorapatite to carry out calculations based	Control work		Laboratory work, Control work

18	Chemical structure of materials used in dentistry. Final lesson.					on solubility constants. Application of knowledge of the chemical bases of the processes of demineralization and remineralization of tooth enamel to explain the pathogenesis of caries.		Colloquium*
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* a mandatory form of current assessment (the control form for which each student receives a mark)