

**Thematic plan of seminar-type classes  
in discipline « General pharmaceutical chemistry »  
for students of 2023 year of admission  
under the educational programme  
33.05.01 Pharmacy,  
specialisation (profile) Pharmacy  
(Specialist's degree),  
form of study full-time  
for the 2025-2026 academic year**

№	Thematic blocks	Practical training in the framework of the thematic block <sup>3</sup>	Hours (academic) <sup>4</sup>
<b>4 term</b>			
1.	Safety precautions when working in the pharmaceutical chemistry laboratory. Verification of residual knowledge <sup>1</sup> . Fundamentals of legislation. Terminology in pharmaceutical chemistry, nomenclature. Methodological foundations of the classification of medicines. Classification of medicinal products <sup>2</sup> .	-	4
2.	Medicinal products of various origins <sup>1</sup> . Medicinal products of plant, animal, and microbial origin. Medicinal products of mineral, synthetic origin <sup>2</sup> .	-	4
3.	The reasons for the creation of new medicines <sup>1</sup> . The main stages of research and development of medicines. International standards. Search and construction of leading substances <sup>2</sup> .	-	4
4.	Computer modeling as a method of designing medicines. Targeted design of new drugs <sup>1</sup> . Design of new molecular structures with specified properties – drug design <sup>2</sup> .	-	4
5.	The procedure and features of intra-pharmacy quality control of medicines. Equipment of the control and analytical cabinet (table) <sup>1</sup> . Professional and job requirements for a pharmacist-analyst of a pharmacy. Nomenclature of titrated solutions, reagents and tracers <sup>2</sup> .	PT	4
6.	Pharmaceutical analysis <sup>1</sup> . Features of pharmaceutical analysis. Classification of the method. Criteria of the analysis. Types of activities carried out during pharmaceutical analysis <sup>2</sup> .	-	4
7.	Chemical methods of pharmacopoeial analysis – authenticity of medicinal products of inorganic nature <sup>1</sup> . Identification of cations of medicinal products of inorganic nature <sup>2</sup> .	PT	4
8.	Chemical methods of pharmacopoeial analysis – authenticity of medicinal products of inorganic nature <sup>1</sup> . Identification of anions of medicinal products of inorganic nature <sup>2</sup> .	PT	4
9.	Control of knowledge, skills, and abilities in modular units 1 and 2 <sup>1</sup> .	PT	4
10.	Chemical methods of pharmacopoeial analysis – authenticity of medicinal products of organic nature (identification of functional groups) <sup>1</sup> . Identification of the primary aromatic group. Identification of the aromatic nitro group <sup>2</sup> .	PT	4

11.	Chemical methods of pharmacopoeial analysis – authenticity of medicinal products of organic nature (identification of functional groups) <sup>1</sup> . Identification of the hydroxyl group. Identification of the aldehyde and keto group <sup>2</sup> .	PT	4
12.	Chemical methods of pharmacopoeial analysis – authenticity of medicinal products of organic nature (identification of functional groups) <sup>1</sup> . Identification of carboxyl, ester, and amide groups <sup>2</sup> .	PT	4
13.	Chemical methods of pharmacopoeial analysis – authenticity of medicinal products of organic nature (identification of functional groups) <sup>1</sup> . Identification of organoelement medicinal substances <sup>2</sup> .	PT	4
14.	Sources and causes of poor quality of medicines <sup>1</sup> . Impurities of inorganic ions <sup>2</sup> .	PT	4
15.	Chemical purity tests of medicinal substances. Impurities of inorganic ions <sup>1</sup> . Impurities. Heavy metal impurities. Arsenic impurity <sup>2</sup> .	PT	4
16.	Research work. Determination of the purity of "Purified water" <sup>1</sup> . Determination of impurities in technical water <sup>2</sup> .	PT	4
17.	Control of knowledge, skills, and abilities in the modular unit 3 <sup>1</sup> .	PT	4
18.	Control of the level of formation of practical skills and abilities in modular units 1, 2, 3 <sup>1</sup> .	PT	4
	Total		72
<b>5 term</b>			
1.	Safety precautions when working in the pharmaceutical chemistry laboratory. Verification of residual knowledge. Chemical methods of analysis of medicinal substances <sup>1</sup> . Quantitative analysis. Classification of methods. The criteria of analysis <sup>2</sup> .	-	4
2.	Chemical methods of pharmacopoeial analysis – quantitative assessment of medicinal products <sup>1</sup> . Classification of methods. Quantitative assessment of medicines. Gravimetry <sup>2</sup> .	PT	4
3.	Solving situational and computational problems <sup>1</sup> .	-	4
4.	Chemical methods of pharmacopoeial analysis – quantitative assessment of medicines. Titrimetric methods of analysis <sup>1</sup> . Classification. Requirements. Titration methods. Preparation of titrated solutions by precise suspension and fixation channel. Setting the titer of the working solution. The equivalence point. Computation <sup>2</sup> .	PT	4
5.	Chemical methods of pharmacopoeial analysis – quantitative assessment of medicines. Determination of organic acids and bases <sup>1</sup> . Neutralization. Alkalimetry. Acidometry. Non-aqueous titration <sup>2</sup> .	PT	4
6.	Precipitation titration. Argentometry <sup>1</sup> . The Mohr method. Folgard and Faience methods <sup>2</sup> .	PT	4
7.	Chemical methods of pharmacopoeial analysis – sedimentation titration. Mercurimetry <sup>1</sup> . Titration conditions, working solution, indicator. Advantages and disadvantages of method <sup>2</sup> .	PT	4
8.	Chemical methods of pharmacopoeial analysis – quantitative assessment of medicines. Complexometry <sup>1</sup> . Chemistry. Working solutions. Fixing the equivalence point <sup>2</sup> .	PT	4
9.	Control of knowledge, skills, and abilities in the modular unit 4 <sup>1</sup> .	PT	4
10.	Chemical methods of pharmacopoeial analysis – quantitative assessment of medicines. Redox titration. Permanganometry <sup>1</sup> . Titration conditions, working solution, indicator. Advantages and disadvantages of the method <sup>2</sup> .	PT	4

11.	Chemical methods of pharmacopoeial analysis – quantitative assessment of medicines. Redox titration. Cerimetry. Bichromometry <sup>1</sup> . Titration conditions, working solution, indicator. Advantages and disadvantages of the method <sup>2</sup> .	PT	4
12.	Chemical methods of pharmacopoeial analysis – quantitative assessment of medicines. Redox titration. Bromatometry <sup>1</sup> . Titration conditions, working solution, indicator. Advantages and disadvantages of the method <sup>2</sup> .	PT	4
13.	Chemical methods of pharmacopoeial analysis – quantitative assessment of medicines. Redox titration. Iodometry <sup>1</sup> . Titration conditions, working solution, indicator. Advantages and disadvantages of the method <sup>2</sup> .	PT	4
14.	Chemical methods of pharmacopoeial analysis – quantitative assessment of medicines. Redox titration. Iodochlorometrium <sup>1</sup> . Titration conditions, working solution, indicator. Advantages and disadvantages of the method <sup>2</sup> .	PT	4
15.	Chemical methods of pharmacopoeial analysis – quantitative assessment of medicines. Redox titration. Nitritometry <sup>1</sup> . Titration conditions, working solution, indicator. Advantages and disadvantages of the method <sup>2</sup> .	PT	4
16.	Elementary analysis. Determination of nitrogen in organic compounds <sup>1</sup> . Characteristics, methods of decomposition of substances. The method of combustion in a flask with oxygen. The Kjeldahl Method <sup>2</sup> .	PT	4
17.	Control of knowledge, skills, and abilities in the modular unit 4 <sup>1</sup> .	PT	4
18.	Control of the level of formation of practical skills and abilities in modular units 4 <sup>1</sup> .	PT	4
	Total		72
<b>6 term</b>			
1.	Safety precautions when working in the pharmaceutical chemistry laboratory. Verification of residual knowledge. Quality assurance system of medicines <sup>1</sup> . Standardization of medicines. Validation <sup>2</sup> .	-	4
2.	Basic concepts of metrology <sup>1</sup> . Metrological characteristics of the analysis results. Statistical processing of results <sup>2</sup> .	-	4
3.	Quality control of medicines at all stages of drug production. GMP System <sup>1</sup> . Basic principles and provisions <sup>2</sup> .	-	4
4.	Quality control of medicines in pharmacies at all stages of production and distribution. Intraapular control <sup>1</sup> . Types of control. The procedure and features of intra-pharmacy quality control of medicines <sup>2</sup> .	PT	4
5.	Incompatible combinations of medicines <sup>1</sup> . Types of incompatibilities of medicines, ways to overcome them <sup>2</sup> .	PT	4
6.	Stability of medicines <sup>1</sup> . Stability and shelf life of medicines <sup>2</sup> .	PT	4
7.	Control of knowledge, skills, and abilities in modular units 2 and 3 <sup>1</sup> .	PT	4
8.	Viruses. Classification. Life cycle <sup>1</sup> . Features of chemotherapy of viral infections. Targets for antiviral agents <sup>2</sup> .	-	4
9.	HIV. Structure, pathology. General pharmaceutical analysis of drugs for the treatment of HIV infection <sup>1</sup> . Inhibitors of attachment and fusion: maraviroc, enfuvirtide. Pharmacokinetic enhancers: cobicistat, ritonavir. Reverse transcriptase inhibitors (nucleoside analogues): zidovudine, stavudine, salzitabine, didanosine, abacavir. Non-nucleoside reverse transcriptase inhibitors: efavirenz, delavirdin <sup>2</sup> .	-	4

10.	General pharmaceutical analysis of drugs for the treatment of HIV infection <sup>1</sup> . Protease inhibitors: saquinavir, indinavir, ritonavir. Integrase inhibitors: raltegravir, dolutegravir, elvitegravir <sup>2</sup> .	-	4
11.	The flu virus. Structural features. Pathology. Neuraminidase inhibitors <sup>1</sup> . General pharmaceutical analysis of anti-influenza drugs: oseltamivir, zanamivir, amantadine, remantadine, favipiravir <sup>2</sup> .	-	4
12.	The coronavirus. Structure, pathology <sup>1</sup> . General pharmaceutical analysis of anti-coronavirus drugs: remdisivir, halidesivir, molnupiravir <sup>2</sup> .	-	4
13.	Hepatitis B virus Structure, pathology <sup>1</sup> . General pharmaceutical analysis of hepatitis B drugs: ribavirin, lamivudine <sup>2</sup> .	-	4
14.	Hepatitis C virus. Structure, pathology <sup>1</sup> . General pharmaceutical analysis of drugs for the treatment of hepatitis C virus: sofosbuvir, daclatasvir, ledipasvir, velpatasvir <sup>2</sup> .	-	4
15.	Viruses of the herpesviride family. Structure, pathology <sup>1</sup> . General pharmaceutical analysis of antiherpetic agents: idoxuridine, acyclovir, valacyclovir, vidarabine, flacoside, chelepin D, poludan <sup>2</sup> .	-	4
16.	Cytomegalovirus <sup>1</sup> . General pharmaceutical analysis of anti-cytomegalovirus agents: ganciclovir, foscarnet, letermovir, maribavir <sup>2</sup> .	-	4
17.	Control of knowledge, skills, and abilities in the modular unit 5 <sup>1</sup> .		4
	Total		68
	TOTAL		212

<sup>1</sup> - topic

<sup>2</sup> – essential content

<sup>3</sup> – PT (practical training)

<sup>4</sup> – one thematic block includes several classes, the duration of one class is 45 minutes, with a break between classes of at least 5 minutes.

Considered at the department meeting Pharmaceutical, Toxicological Chemistry, Pharmacognosy and Botany, protocol of «30»     may     2025 г. № 10 .

Head of the Department



A. Ozerov