

**MINISTRY OF HEALTH OF THE REPUBLIC OF BELARUS**  
Educational Institution  
«BELARUSIAN STATE MEDICAL UNIVERSITY»

Контрольный  
экземпляр

**APPROVED**

by Rector of the Educational  
Institution «Belarusian State  
Medical University»



*[Signature]* S.P.Rubnikovich

*26.06.2025*

Reg. # UD *0912-01-25/258/*edu.

**PHARMACOGNOSY**

**Curriculum of the educational institution  
in the academic discipline for the specialty**

**7-07-0912-01 «Pharmacy»**

Curriculum is based on the educational program «Pharmacognosy», approved 26.06.2025, registration УД-0912-01-25/2526/уч., on the educational plan in the specialty 7-07-0912-01 «Pharmacy», approved 16.04.2025, registration # 7-07-0912-01/2526/mf.

### **COMPILERS:**

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### **RECOMMENDED FOR APPROVAL:**

by the Department Organization of Pharmacy of the Educational Institution «Belarusian State Medical University»  
(protocol # 10 of 18.04.2025);

by the Scientific and Methodological Council of the Educational Institution «Belarusian State Medical University»  
(protocol # 10 of 26.06.2025)

## EXPLANATORY NOTE

«Pharmacognosy» – the academic discipline of the module «Pharmaceutical Chemistry and Pharmacognosy», which contains systematized scientific knowledge about medicinal plants, medicinal plant raw materials, medicinal raw materials of animal and natural origin.

The aim of the discipline «Pharmacognosy» is the formation of specialized competencies for a comprehensive study of medicinal plants, medicinal raw materials of plant, animal and natural origin, as well as products of their primary processing; quality control of medicines and medicinal plant raw materials.

The objectives of the discipline «Pharmacognosy» are to form students' scientific knowledge about the rational use, standardization, quality control, storage and processing of medicinal plant raw materials, as well as the use of medicines based on it, skills and abilities necessary for determine the authenticity and quality of medicinal plant raw materials using the methods provided for in regulatory documentation.

### **Relations to other educational disciplines**

The knowledge, skills, and abilities acquired during the study of the academic discipline «Pharmacognosy» are necessary for successful mastering of the modules «Pharmacology and Pharmacotherapy» and «Pharmaceutical Technology».

Studying the educational discipline «Pharmacognosy» should ensure the formation of students' specialized competencies:

choose and use appropriate methods and technologies when conducting quality control of medicines and medicinal plant raw materials, evaluate the obtained results;  
use methods of cultivating medicinal plants, procure medicinal plant raw materials of wild and cultivated medicinal plants.

### **As a result of studying the discipline «Pharmacognosy» the student should know:**

the basic concepts (principles) of nomenclature of medicinal plant raw materials;

the causes and mechanisms of typical system of classification of herbal raw materials;

the main groups of biologically active compounds, their physicochemical properties, methods of isolation, purification, qualitative and quantitative determination, biological standardization;

the main ways and forms of using medicinal plant raw materials and medicinal products of plant and animal origin in pharmacy;

### **be able to:**

select and use appropriate methods when carrying out quality control of medicinal plant raw materials, evaluate the results obtained;

apply the nomenclature of medicinal plant raw materials, medicinal raw materials of animal and natural origin; medicinal herbal preparations approved for medicinal use;

provide pharmaceutical consulting in the sale of herbal preparations, preparations of animal and natural origin, approved for use in medicine;

**master:**

skills of identification of medicinal plants by external signs in a herbarium form;

skills of identification of medicinal plants by external signs in a live;

skills in the technique of preparation of micropreparations, conducting qualitative and microchemical reactions to the main biologically active substances contained in medicinal plants and raw materials;

skills in the technique of using titrimetric, gravimetric, spectrometric and chromatographic methods for analysis of herbal medicinal raw materials;

skills in determining the authenticity and quality of medicinal raw materials

**Total number** of hours for the study of the discipline is 325 academic hours, of which 179 classroom hours and 146 hours of student independent work. Classroom hours according to the types of studies: lectures – 27 hours (including 6 hours of supervised student independent work (SSIW)), laboratory classes – 152 hours.

Intermediate assessment is carried out according to the syllabus of the specialty in the form of a credit (5 semester) and examination (6 semester).

Form of higher education – full-time.

### ALLOCATION OF ACADEMIC TIME ACCORDING TO SEMESTERS OF STUDY

Code, name of the specialty	Semester	Total number of academic hours	Number of classroom hours				Out of class self-studies	Form of intermediate assessment
			total	including		laboratory studies		
				class lectures	SSIW			
7-07-0912-01 «Pharmacy»	5	115	91	12	3	76	24	credit
	6	210	88	9	3	76	122	examination
<b>Total hours</b>		<b>325</b>	<b>179</b>	<b>21</b>	<b>6</b>	<b>152</b>	<b>146</b>	-

## THEMATIC PLAN

Section (topic) name	Number of class hours	
	lectures	laboratory
<b>1. General pharmacognosy</b>	<b>4,5</b>	<b>22,5</b>
1.1. Introduction to pharmacognosy. Methods for pharmacognostic analysis of medicinal plant materials	3	18
1.2. Phytotherapy. Medicinal harvests. Herbal teas	1,5	4,5
<b>2. Special pharmacognosy</b>	<b>22,5</b>	<b>129,5</b>
2.1. Polysaccharides. Medicinal plants and medicinal plant raw material containing polysaccharides	1,5	4,5
2.2. Vitamins. Medicinal plants and medicinal plant raw material containing vitamins	1,5	4,5
2.3. Terpenoids. Essential oils. Medicinal plants and medicinal plant raw material containing essential oils	3	13,5
2.4. Iridoids. Medicinal plant raw material containing iridoids	1,5	9
2.5. Cardiac glycosides. Medicinal plants and medicinal plant raw material containing cardiac glycosides	1,5	4,5
2.6. Saponins. Medicinal plants and medicinal plant raw material containing saponins		9
2.7. Phenol glycosides and lignans. Medicinal plants and medicinal plant raw material containing phenol glycosides and lignans	1,5	4,5
2.8. Anthracene derivatives. Medicinal plants and medicinal plant raw material containing anthracene derivatives	1,5	8,5
2.9. Coumarins and chromones. Medicinal plants and medicinal plant raw material, which contains coumarins and chromones	-	4,5
2.10. Flavonoids. Medicinal plants and medicinal plant raw material, which contains flavonoids	3	13,5
2.11. Tannins. Medicinal plants and medicinal plant raw materials, which contains tannins	1,5	13,5
2.12. Alkaloids. Medicinal plants and medicinal plant raw material, which contains alkaloids	3	13,5
2.13. Medicinal plants and medicinal plant raw materials, which contains various groups of biologically active substances	3	26,5
<b>Total hours</b>	<b>27</b>	<b>152</b>

## CONTENT OF THE EDUCATIONAL DISCIPLINE

### 1. General pharmacognosy

#### 1.1. Introduction to pharmacognosy. Methods for pharmacognostic analysis of medicinal plant materials

Pharmacognosia: definition, basic concepts (medicinal plants (MP), of medicinal plant raw material (MPRM), official medicinal plant material, pharmacopoeial medicinal raw material).

Chemical composition of medicinal plants. Minerals and organic substances of MP. Organic substances of primary and secondary metabolism.

Biologically active substances. Operating, concomitant and ballast substances.

Classification of medicinal plant raw material (MPRM). Types of classifications MPRM.

Normative documents for MPRM: normative document on quality, pharmacopoeial monograph.

Pharmacognostic analysis: definition, purpose and objectives.

Morphological groups: leaves, herbs, flowers, fruits, seeds, bark, roots, rhizomes, bulbs, tubers, corms. Pharmacognostic analysis of plant raw materials of various morphological groups.

Methods for determining the authenticity of MPRM: macroscopic analysis, microscopic analysis, qualitative chemical analysis, chromatographic analysis, luminescence analysis.

Methods for determining the quality of medicinal products: macroscopic analysis, quantitative chemical (phytochemical) analysis, commodity analysis, biological standardization.

Quality control of MPRM. Acceptance, sample size, sampling of pharmaceutical products. Testing. Indicators of quality and safety of pharmaceutical products. Determination of numerical indicators.

Determination of the authenticity and quality of whole medicinal plant raw materials by macroscopic and microscopic methods according to the State Pharmacopoeia of the Republic of Belarus.

Determination of the quality of medicinal plant raw materials by quantitative determination: permissible impurities according to the State Pharmacopoeia of the Republic of Belarus.

#### 1.2. Phytotherapy. Medicinal harvests. Herbal teas

Phytotherapy: definition, features, rules and principles. Biorhythmological characteristics MPRM.

Medicinal harvests: definition, classification, production, indicators of authenticity and quality. Principles for drawing up medicinal harvests.

Herbal teas: definition, production, indicators of authenticity and quality.

### 2. Special pharmacognosy

#### 2.1. Polysaccharides. Medicinal plants and medicinal plant raw material containing polysaccharides

Polysaccharides: definition and classification. Starch, inulin, pectin substances, mucus, gums, polysaccharides of algae.

Physico-chemical properties of mucus, their detection and quantification. The use of polysaccharides in medicine.

Mucus: definition, classification, physicochemical properties, qualitative analysis, isolation methods, quantitative determination, application in medicine.

MPM and MPRM and medicinal products containing polysaccharides. The name of the drug producing drug and family in Russian and Latin. External signs of herbarium specimens of species producing MPRM. Differences from morphologically similar plant species and MPM impurities.

Chemical composition of medicinal products. Application in medicine.

Pharmaceutical consulting in the sale of herbal preparations containing polysaccharides.

## **2.2. Vitamins. Medicinal plants and medicinal plant raw material containing vitamins**

Vitamins: definition, classification, physicochemical properties, qualitative analysis, isolation methods, quantitative determination, application in medicine.

MPM and MPRM and medicinal products containing vitamins. The name of the drug producing drug and family in Russian and Latin. External signs of herbarium specimens of species producing MPRM. Differences from morphologically similar plant species and MPM impurities.

Chemical composition of medicinal products. Application in medicine.

Pharmaceutical consulting in the sale of herbal preparations containing polysaccharides.

## **2.3. Terpenoids. Essential oils. Medicinal plants and medicinal plant raw material containing essential oils**

Terpenoids: definition, classification.

Essential oils: definition, classification, physicochemical properties, qualitative analysis, isolation methods, quantitative determination, use in medicine.

MPM and MPRM and medicinal products containing essential oils: monoterpenoids (acyclic, monocyclic, bicyclic), sesquiterpenoids, aromatic compounds. The name of the drug producing drug and family in Russian and Latin. External signs of herbarium specimens of species producing MPRM. Differences from morphologically similar plant species and MPM impurities.

Chemical composition of medicinal products. Application in medicine.

Pharmaceutical consulting in the sale of herbal preparations containing essential oils.

## **2.4. Iridoids. Medicinal plant raw material containing iridoids**

Iridoids, bitters: definition, classification, physicochemical properties, qualitative analysis, isolation methods, quantitative determination, application in medicine.

MPM and MPRM and medicinal products containing iridoids. The name of the drug producing drug and family in Russian and Latin. External signs of herbarium specimens of species producing MPRM. Differences from morphologically similar plant species and MPM impurities.

Chemical composition of medicinal products. Application in medicine.

Pharmaceutical consulting in the sale of herbal preparations containing iridoids.

### **2.5. Cardiac glycosides. Medicinal plants and medicinal plant raw material containing cardiac glycosides**

Cardiac glycosides: definition, classification, physicochemical properties, qualitative analysis, isolation methods, quantitative determination, medical applications.

MPM and MPRM and medicinal products containing cardiac glycosides. The name of the drug producing drug and family in Russian and Latin. External signs of herbarium specimens of species producing MPRM. Differences from morphologically similar plant species and MPM impurities.

Chemical composition of medicinal products. Application in medicine.

Pharmaceutical consulting in the sale of herbal preparations containing cardiac glycosides.

### **2.6. Saponins. Medicinal plants and medicinal plant raw material containing saponins**

Saponins: definition, classification, physico-chemical properties, qualitative analysis, isolation methods, quantitative determination, application in medicine.

MPM and MPRM and medicinal products containing saponins. The name of the drug producing drug and family in Russian and Latin. External signs of herbarium specimens of species producing MPRM. Differences from morphologically similar plant species and MPM impurities.

Chemical composition of medicinal products. Application in medicine.

Pharmaceutical consulting in the sale of herbal preparations containing saponins.

### **2.7. Phenol glycosides and lignans. Medicinal plants and medicinal plant raw material containing phenol glycosides and lignans**

Phenol glycosides, lignans: definition, classification, physico-chemical properties, qualitative analysis, isolation methods, quantitative determination, application in medicine.

MPM and MPRM and medicinal products containing phenol glycosides and lignans. The name of the drug producing drug and family in Russian and Latin. External signs of herbarium specimens of species producing MPRM. Differences from morphologically similar plant species and MPM impurities.

Chemical composition of medicinal products. Application in medicine.

Pharmaceutical consulting in the sale of herbal preparations containing phenolglycosides and lignans.

### **2.8. Anthracene derivatives. Medicinal plants and medicinal plant raw material containing anthracene derivatives**

Anthracene derivatives: definition, classification, physicochemical properties, qualitative analysis, isolation methods, quantitative determination, application in medicine.

MPM and MPRM and medicinal products containing anthracene derivatives. The name of the drug producing drug and family in Russian and Latin. External signs

of herbarium specimens of species producing MPRM. Differences from morphologically similar plant species and MPM impurities.

Chemical composition of medicinal products. Application in medicine.

Pharmaceutical consulting in the sale of herbal preparations containing anthracene derivatives.

### **2.9. Coumarins and chromones. Medicinal plants and medicinal plant raw material, which contains coumarins and chromones**

Coumarins, chromones: definition, classification, physicochemical properties, qualitative analysis, isolation methods, quantitative determination, application in medicine.

MPM and MPRM and medicinal products containing coumarins, chromones. The name of the drug producing drug and family in Russian and Latin. External signs of herbarium specimens of species producing MPRM. Differences from morphologically similar plant species and MPM impurities.

Chemical composition of medicinal products. Application in medicine.

Pharmaceutical consulting in the sale of herbal preparations containing coumarins, chromones.

### **2.10. Flavonoids. Medicinal plants and medicinal plant raw material, which contains flavonoids**

Flavonoids: definition, classification, physicochemical properties, qualitative analysis, isolation methods, quantitative determination, medical use.

MPM and MPRM and medicinal products containing flavonoids. The name of the drug producing drug and family in Russian and Latin. External signs of herbarium specimens of species producing MPRM. Differences from morphologically similar plant species and MPM impurities.

Chemical composition of medicinal products. Application in medicine.

Pharmaceutical consulting in the sale of herbal preparations containing flavonoids.

### **2.11. Tannins. Medicinal plants and medicinal plant raw materials, which contains tannins**

Tannins: definition, classification, physico-chemical properties, qualitative analysis, isolation methods, quantitative determination, application in medicine.

MPM and MPRM and medicinal products containing tannins. The name of the drug producing drug and family in Russian and Latin. External signs of herbarium specimens of species producing MPRM. Differences from morphologically similar plant species and MPM impurities.

Chemical composition of medicinal products. Application in medicine.

Pharmaceutical consulting in the sale of herbal preparations containing tannins.

### **2.12. Alkaloids. Medicinal plants and medicinal plant raw material, which contains alkaloids**

Alkaloids: definition, classification, physicochemical properties, qualitative analysis, isolation methods, quantitative determination, medical applications.

MPM and MPRM and medicinal products containing alkaloids: acyclic, with nitrogen in the side chain, derivatives of pyrrolizidine, tropane, quinolizidine, isoquinoline, purine, indole, steroidal alkaloids (glycoalkaloids).

The name of the drug producing drug and family in Russian and Latin. External signs of herbarium specimens of species producing MPRM. Differences from morphologically similar plant species and MPM impurities.

Chemical composition of medicinal products. Application in medicine.

Pharmaceutical consulting in the sale of herbal preparations containing alkaloids.

### **2.13. Medicinal plants and medicinal plant raw material, which contains various groups of biologically active substances**

MPM and MPRM and medicinal products containing various groups of biologically active substances.

The name of the drug producing drug and family in Russian and Latin. External signs of herbarium specimens of species producing MPRM. Differences from morphologically similar plant species and MPM impurities.

Chemical composition of medicinal products. Application in medicine.

Pharmaceutical consulting in the sale of herbal preparations containing various groups of biologically active substances.

## **REQUIREMENTS FOR COURSEWORK**

In accordance with the curriculum of the educational institution for the specialty 7-07-0912-01 «Pharmacy», 36 hours are allocated for completing the coursework.

The defense of term papers is held in the 6th semester.

The purpose of the coursework: deepening and expanding theoretical knowledge, mastering the techniques of independent work with scientific literature, logically consistent presentation of material, developing the ability to draw conclusions and document the results (writing a coursework, preparing a report and presentation), as well as acquiring skills for publicly defending the completed work (report, answering questions).

Completing a term paper includes the following stages:

1. Familiarization with the methodological recommendations for completing a term paper.
2. Selecting a topic from the list proposed by the department, agreeing on it with the academic supervisor, and preparing the assignment for the term paper.
3. Selecting and studying literature on the selected topic.
4. Drawing up a work plan and work schedule.
5. Collecting and processing factual material.
6. Adjusting the work plan and agreeing it with the academic supervisor.
7. Writing sections of the work, formulating conclusions, findings, and generalizations based on its results.
8. Technical design of the term paper in accordance with the established requirements.
9. Submitting the work to the academic supervisor for verification.
10. Receiving a written review from the academic supervisor and eliminating the deficiencies noted by him/her.
11. Obtaining admission to defend the term paper and defending it.

**EDUCATIONAL DISCIPLINE «PHARMACOGNOSY» CURRICULAR CHART**

Section, topic #	Section (topic) name	Number of classroom hours		Supervised student independent work	Literature	Practical skill	Form of control	
		lectures	laboratory				of practical skills	of current / intermediate assessment
<b>5 semester</b>								
	<b>Lectures</b>	<b>12</b>	<b>-</b>	<b>3</b>				
1.	<b>General pharmacognosy</b>	-	-	-				
1.1	Introduction to pharmacognosy. Methods for pharmacognostic analysis of medicinal plant materials	1,5	-	1,5	1-4			Interview, testing
2.	<b>Special pharmacognosy</b>	-	-	-				
2.1	Polysaccharides. Medicinal plants and medicinal plant raw materials containing polysaccharides	1,5	-	-	1-4			
2.2	Vitamins. Medicinal plants and medicinal plant raw materials containing vitamins	1,5	-	-	1-4			
2.3	Terpenoids. Essential oils. Medicinal plants and medicinal plant raw materials containing aromatic essential oils, monoterpenes, sesquiterpenes	1,5	-	1,5	1-4			Interview, testing
2.4	Iridoids. Medicinal plants and medicinal plant raw materials containing iridoids	1,5	-	-	1-4			
2.5, 2.6	Cardiac glycosides. Medicinal plants and medicinal plant raw material containing cardiac glycosides. Saponins. Medicinal plants and medicinal plant raw material containing saponins	1,5	-	-	1-4			

2.7	Phenolglycosides. Lignans. Medicinal plants and medicinal plant raw materials containing phenol glycosides, lignans	1,5	-	-	1-4			
2.8	Anthracene derivatives. Medicinal plants and medicinal plant raw materials containing anthracene derivatives	1,5	-	-	1-4			
	<b>Laboratory work</b>	-	<b>76</b>	-				
1.	<b>General pharmacognosy</b>	-	-	-				
1.1	Introduction to pharmacognosy. Methods for pharmacognostic analysis of medicinal plant materials. Macroscopic analysis	-	4,5	-	1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic method in accordance with technical normative legal acts (TNLA)	Performing a practical skill in a laboratory setting	Laboratory work report
1.1	Methods of pharmacognostic analysis of medicinal plant materials. Microscopic analysis	-	4,5	-	1-4	Determination of the authenticity of medicinal plant raw materials by microscopic method in accordance with TNLA	Performing a practical skill in a laboratory setting	Laboratory work report
1.1	Methods of pharmacognostic analysis of medicinal plant raw materials. Quality control of medicinal plant raw materials. Determination of numerical indicators	-	4,5	-	1-4	Determination of the quality of medicinal plant raw materials by the method of quantitative analysis for permissible impurities in accordance with TNLA	Performing a practical skill in a laboratory setting	Laboratory work report
1.1	Final lesson on the topic: «Methods for pharmacognostic analysis of medicinal plant materials»	-	4,5	-	1-4	Determination of the quality of medicinal plant raw materials by the method of quantitative analysis for permissible impurities in accordance with TNLA	Performing a practical skill in a laboratory setting	Laboratory work report, colloquium*
2.	<b>Private pharmacognosy</b>							
2.1	Polysaccharides. Medicinal plants and	-	4,5	-	1-4	Determination of the	Performing a	Laboratory work

	medicinal plant raw materials containing polysaccharides					authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA. Determination of the quality of medicinal plant raw materials by quantitative analysis method for the main group of biologically active substances (BAS) in accordance with TNLA	practical skill in a laboratory setting	report
2.2	Vitamins. Medicinal plants and medicinal plant raw materials containing vitamins	-	4,5	-	1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA. Determination of the authenticity of medicinal plant raw materials by thin-layer chromatography (TLC) in accordance with TNLA. Determination of the quality of medicinal plant raw materials by quantitative analysis for the main group of BAS in accordance with TNLA	Performing a practical skill in a laboratory setting	Laboratory work report
2.3	Terpenoids. Essential oils. Medicinal plants and medicinal plant raw materials containing aromatic essential oils	-	4,5	-	1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic	Performing a practical skill in a laboratory setting	Laboratory work report

						and microscopic methods in accordance with TNLA. Determination of the quality of medicinal plant raw materials by quantitative analysis method for the main group of BAS in accordance with TNLA		
2.3	Monoterpenes. Medicinal plants and medicinal plant materials containing monoterpenes	-	4,5	-	1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA	Performing a practical skill in a laboratory setting	Laboratory work report
2.3	Sesquiterpenes. Medicinal plants and medicinal plant materials containing sesquiterpenes	-	4,5	-	1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA. Determination of the authenticity of medicinal plant raw materials by TLC method in accordance with TNLA	Performing a practical skill in a laboratory setting	Laboratory work report
2.4	Iridoids. Medicinal plants and medicinal plant raw materials containing iridoids	-	4,5	-	1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA. Determination of the authenticity of medicinal plant raw materials by TLC	Performing a practical skill in a laboratory setting	Laboratory work report

						method in accordance with TNLA. Determination of the quality of medicinal plant raw materials by quantitative analysis method for the main group of BAS in accordance with TNLA		
2.4	Final lesson on the topic: «Polysaccharides. Vitamins. Terpenoids. Essential oils. Iridoids. Medicinal plants and medicinal plant raw materials containing these groups of biologically active substances»	-	4,5	-	1-4	Determination of the authenticity of herbarium samples of medicinal plants and medicinal plant materials	Performing a practical skill in a laboratory setting	Testing, colloquium*
2.5	Cardiac glycosides. Medicinal plants and medicinal plant raw materials containing cardiac glycosides	-	4,5	-	1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA. Determination of the authenticity of medicinal plant raw materials by TLC method in accordance with TNLA. Determination of the quality of medicinal plant raw materials by quantitative analysis method for the main group of BAS in accordance with TNLA	Performing a practical skill in a laboratory setting	Laboratory work report
2.6	Saponins. Analysis of medicinal plant materials containing saponins	-	4,5	-	1-4	Determination by TLC method of authenticity of medicinal plant raw	Performing a practical skill in a laboratory	Laboratory work report

						materials according to TNLA. Determination by quantitative analysis method of medicinal plant raw material quality according to the main group of BAS according to TNLA	setting	
2.6	Medicinal plants and medicinal plant materials containing saponins	-	4,5	-	1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA	Performing a practical skill in a laboratory setting	Laboratory work report
2.7	Phenolglycosides. Lignans. Medicinal plants and medicinal plant raw materials containing phenol glycosides, lignans	-	4,5	-	1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA. Determination of the authenticity of medicinal plant raw materials by TLC method in accordance with TNLA	Performing a practical skill in a laboratory setting	Laboratory work report
2.8	Anthracene derivatives. Medicinal plants and medicinal plant raw materials containing anthracene derivatives		4,5		1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA. Determination of the authenticity of medicinal plant raw materials by TLC	Performing a practical skill in a laboratory setting	Laboratory work report

						method in accordance with TNLA. Determination of the quality of medicinal plant raw materials by quantitative analysis method for the main group of BAS in accordance with TNLA		
2.8	Final lesson on the topic: «Cardiac glycosides. Saponins. Phenolglycosides. Lignans. Anthracene derivatives. Medicinal plants and medicinal plant raw materials containing these groups of biologically active substances»		4		1-4	Determination of the authenticity of herbarium samples of medicinal plants and medicinal plant materials	Performing a practical skill in a laboratory setting	Test, colloquium*
		<b>12</b>	<b>76</b>	<b>3</b>				
	<b>6 semester</b>							
	<b>Lectures</b>	<b>9</b>	<b>-</b>	<b>3</b>	<b>-</b>			
	<b>2. Special pharmacognosy</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>			
2.10	Flavonoids. Medicinal plants and medicinal plant raw materials containing flavonoids	1,5	-	1,5	1-4			Interview, testing
2.11	Tannins. Medicinal plants and medicinal plant raw materials containing tannins	1,5	-	-	1-4			
2.12	Alkaloids. Medicinal plants and medicinal plant materials containing alkaloids with nitrogen in the side chain, pyrrolizidine, tropane	1,5	-	-	1-4			
2.12	Alkaloids. Medicinal plants and medicinal plant raw materials containing alkaloids, derivatives of quinolizidine, isoquinoline, indole, purines, steroids	1,5			1-4			
2.13	Medicinal plants and medicinal plant raw materials containing various groups of biologically active substances. Medicinal	1,5	-	1,5	1-4			Interview, testing

	raw materials of animal and natural origin							
<b>1.</b>	<b>General pharmacognosy</b>	-	-	-	-			
1.2	Phytotherapy. Medicinal harvests. Herbal teas	1,5	-	-	1-4			
	<b>Laboratory exercises</b>	-	<b>76</b>	-				
<b>2.</b>	<b>Special pharmacognosy</b>							
2.9	Coumarins and chromones. Medicinal plants and medicinal plant raw materials containing coumarins and chromones	-	4,5	-	1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA. Determination of the authenticity of medicinal plant raw materials by TLC method in accordance with TNLA	Performing a practical skill in a laboratory setting	Laboratory work report
2.10	Flavonoids. Analysis of medicinal plant materials containing flavonoids	-	4,5	-	1-4	Determination by TLC method of authenticity of medicinal plant raw materials according to TNLA. Determination by quantitative analysis method of medicinal plant raw material quality according to the main group of BAS according to TNLA	Performing a practical skill in a laboratory setting	Laboratory work report
2.10	Flavonoids. Medicinal plants and medicinal plant materials containing flavonoids of the flavone group	-	4,5	-	1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA	Performing a practical skill in a laboratory setting	Laboratory work report

2.10	Flavonoids. Medicinal plants and medicinal plant materials containing flavonoids of the flavan group, chalcones, aurones, isoflavonoids	-	4,5	-	1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA. Determination of the authenticity of medicinal plant raw materials by TLC method in accordance with TNLA	Performing a practical skill in a laboratory setting	Laboratory work report
2.11	Tannins. Analysis of medicinal plant materials containing tannins	-	4,5	-	1-4	Determination by the method of quantitative analysis of the quality of medicinal plant raw materials for the main group of BAS according to TNLA	Performing a practical skill in a laboratory setting	Laboratory work report
2.11	Tannins. Medicinal plants and medicinal plant materials containing tannins	-	4,5	-	1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA. Determination of the authenticity of medicinal plant raw materials by TLC method in accordance with TNLA	Performing a practical skill in a laboratory setting	Laboratory work report
2.11	Final lesson on the topic: «Coumarins. Chromones. Flavonoids. Tannins. Medicinal plants and medicinal plant raw materials containing these groups of biologically active substances»	-	4,5	-	1-4	Determination of the authenticity of herbarium samples of medicinal plants and medicinal plant materials	Performing a practical skill in a laboratory setting	Testing, colloquium*
2.12	Alkaloids. Analysis of medicinal plant	-	4,5	-	1-4	Determination by the	Performing a	Laboratory work

	materials containing alkaloids					method of quantitative analysis of the quality of medicinal plant raw materials for the main group of BAS according to TNLA	practical skill in a laboratory setting	report
2.12	Alkaloids. Medicinal plants and medicinal plant materials containing alkaloids with nitrogen in the side chain, pyrrolizidine, tropane	-	4,5	-	1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA	Performing a practical skill in a laboratory setting	Laboratory work report
2.12	Alkaloids. Medicinal plants and medicinal plant raw materials containing alkaloids derivatives of quinolizidine, isoquinoline, indole, purine, steroid	-	4,5	-	1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA. Determination of the authenticity of medicinal plant raw materials by TLC method in accordance with TNLA	Performing a practical skill in a laboratory setting	Laboratory work report
2.13	Medicinal plants and medicinal plant raw materials containing various groups of biologically active substances		4,5		1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA. Determination of the quality of medicinal plant raw materials by quantitative analysis method for the main group of BAS in accordance with TNLA	Performing a practical skill in a laboratory setting	Laboratory work report

2.13	Medicinal raw materials of animal and natural origin		4,5		1-4	Determination by the method of quantitative analysis of the quality of medicinal plant raw materials for the main group of BAS according to TNLA	Performing a practical skill in a laboratory setting	Laboratory work report
2.13	Final lesson on the topic: «Alkaloids. Medicinal plants and medicinal plant raw materials containing various groups of biologically active substances. Medicinal raw materials of animal and natural origin»		4,5		1-4	Determination of the authenticity of herbarium samples of medicinal plants and medicinal plant materials	Performing a practical skill in a laboratory setting	Testing, colloquium*
<b>1.</b>	<b>General pharmacognosy</b>	-	-	-	-			
1.2.	Phytotherapy. Medicinal harvests. Herbal teas	-	4,5	-	1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA	Performing a practical skill in a laboratory setting	Laboratory work report
2.13	Final lesson on the sections «General Pharmacognosy», «Special Pharmacognosy»	-	4,5	-	1-4	Determination of the authenticity of herbarium samples of medicinal plants and medicinal plant materials	Performing a practical skill in a laboratory setting	Evaluation of the determination of the authenticity of herbarium samples of medicinal plants, evaluation of the determination of the authenticity and quality of medicinal plants samples, solving situational problems
2.13	Final lesson on the sections «General Pharmacognosy», «Special Pharmacognosy»	-	4,5	-	1-4	Determination of the authenticity and quality of medicinal plant raw materials by macroscopic	Interview, written work	Practical exercise report, case study

						and microscopic methods in accordance with TNLA. Determination of the authenticity of medicinal plant raw materials by TLC method in accordance with TNLA. Determination of the quality of medicinal plant raw materials by quantitative analysis method for the main group of BAS in accordance with TNLA		
2.13	Final lesson on the section «Special Pharmacognosy»	-	4	-	1-4		interview, written work	Defense of the report
	<b>Total hours for the academic discipline</b>	<b>21</b>	<b>152</b>	<b>6</b>				Exam

\*This is a mandatory form of current certification

## INFORMATION AND INSTRUCTIONAL UNIT

### LITERATURE

#### **Basic (relevant):**

1. Szöke, É. From Herbs to Healing: Pharmacognosy Phytochemistry - Phytotherapy - Biotechnology / É. Szöke, Á. Kéry, É. Lemberkovics. – Springer, 2023 – 587 p.

#### **Additional:**

2. Ahmed, S. Introduction to Pharmacognosy. Definition, History and Scope / S. Ahmed. – I K International Publishing House, 2019 – 416 p.

3. Narayana, P.S. Textbook of Pharmacognosy Second Edition Volume I / P.S. Narayana, T. Pullaiah, D. Varalakshmi. – CBS Publishers & Distributors Pvt. Ltd, 2023 – 358 p.

#### **Electronic courseware for the educational discipline «Pharmacognosy»:**

4. <https://etest.bsmu.by/course/view.php?id=175>

### METHODOLOGICAL RECOMMENDATIONS FOR THE ORGANIZATION AND PERFORMANCE OF STUDENT INDEPENDENT WORK IN THE ACADEMIC DISCIPLINE

The time allocated for independent work can be used by students to:

- prepare for lectures, laboratory classes;
- prepare for final classes, tests and exams in the academic discipline;
- study topics (questions) submitted for independent study;
- solve problems;
- complete research assignments;
- prepare presentations;
- compiling a review of scientific literature on a given topic;
- completing practical assignments;
- taking notes on educational literature;
- preparing reports;
- compilation of a thematic selection of literary sources, Internet sources;
- study of instructions for medical use of herbal medicines;
- study of collections of herbarium samples of medicinal plants, samples of medicinal plant raw materials.

### METHODOLOGICAL RECOMMENDATIONS FOR THE ORGANIZATION AND PERFORMANCE OF SUPERVISED STUDENT INDEPENDENT WORK IN THE ACADEMIC DISCIPLINE

#### **APPROXIMATE LIST OF TASKS FOR SUPERVISED STUDENT INDEPENDENT WORK:**

- preparing presentations;
- taking notes from primary sources (collections of documents, monographs, educational publications, etc.);
- compiling tests for organizing mutual control;
- designing information and demonstration materials (stands, posters, graphs, tables, newspapers, etc.).

**FORMS OF CONTROL OF SUPERVISED STUDENT INDEPENDENT WORK:**

interview;  
testing.

**LIST OF AVAILABLE DIAGNOSTIC TOOLS**

The following forms of current certification are used to diagnose competencies:

interview;  
test;  
colloquium;  
report defense;  
solving situational problems;  
visual laboratory work;  
report on practical exercise;  
report on laboratory work;  
evaluation of determination of authenticity of herbarium samples of medicinal plants;  
evaluation of determination of authenticity and quality of samples of medicinal plant raw materials.

**LIST OF AVAILABLE TEACHING METHODS**

Traditional method;  
active (interactive) methods:  
    Problem-Based Learning (PBL);  
    Team-Based Learning (TBL);  
    Research-Based Learning (RBL).

**LIST OF PRACTICAL SKILLS**

Name of practical skills	Form of practical skills control
1. Determination of the authenticity and quality of medicinal plant raw materials by macroscopic and microscopic methods in accordance with TNLA	Performing a practical skill in a laboratory setting. Laboratory work report
2. Determination of the authenticity of medicinal plant materials by TLC method in accordance with TNLA	Performing a practical skill in a laboratory setting. Laboratory work report
3. Determination of the quality of medicinal plant raw materials by quantitative analysis method for the main group of biologically active substances (BAS) in accordance with TNLA	Performing a practical skill in a laboratory setting. Laboratory work report
4. Determination of the quality of medicinal plant raw materials by the method of quantitative analysis for permissible impurities in accordance with TNLA	Performing a practical skill in a laboratory setting. Laboratory work report
5. Determination of the authenticity of herbarium samples of medicinal plants and medicinal plant materials	Performing a practical skill in a laboratory setting. Laboratory work report

**LIST OF EQUIPMENT USED**

1. Analytical balances.
2. Electronic precision scales.
3. Spectrophotometer.
4. Photocolorimeter;
5. Laboratory water bath.
6. Laboratory shaker.
7. Ginsberg device.
8. Rotary evaporator.
9. Microscope.
10. Ultraviolet lamp.
11. Laboratory centrifuge.
12. Ultrasonic bath.
13. Laboratory drying cabinet
14. Herbarium samples of medicinal plants.
15. Samples of medicinal plant materials.

**PROTOCOL OF CURRICULUM APPROVAL**

Name of the academic discipline that requires approval	Department name	Proposals for changes in the content of the curriculum of an institution of higher education in an academic discipline	The decision taken by the department that developed the curriculum (indicating the date and protocol number)
1. Pharmaceutical Care	Department of Pharmacy Organization with a course of advanced training and retraining	No	Protocol # 10 of 18.04.2025
2. Pharmacy Technology of Drugs	Department of Pharmaceutical Technology with a course of advanced training and retraining	No	Protocol # 10 of 18.04.2025
3. Pharmaceutical Chemistry	Department of Pharmaceutical Chemistry with a course of advanced training and retraining	No	Protocol # 10 of 18.04.2025

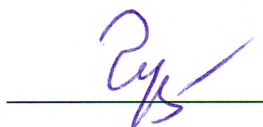
## COMPILERS/AUTHORS:

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V.V.Mushkina

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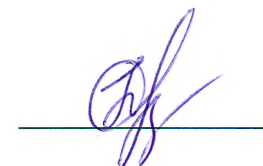
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Y.V.Tratsiakova

Curriculum content, composition and the accompanying documents comply with the established requirements.

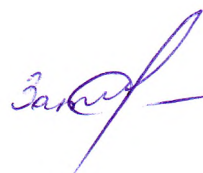
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