

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

APPROVED

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

S.P. Rubnikovich



Reg # UD-25-19/2425 /edu.



PHARMACOGNOSY

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

1-79 01 08 «Pharmacy»

Curriculum is based on the educational program «Pharmacognosy», approved 27.06.2023, registration УД-Л.08-19/2324/уч., on the educational plan in the specialty 1-79 01 08 «Pharmacy», approved 15.05.2024, registration # L 7-07-0912-01/2425/mf.

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RECOMMENDED FOR APPROVAL:

by the Department Organization of Pharmacy of the educational institution «Belarusian State Medical University»
(protocol # 13 of 14.06.2024);

by the Scientific and Methodological Council of the educational institution «Belarusian State Medical University»
(protocol # 18 of 26.06.2024)

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.

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.

SC. Choose and use appropriate methods and technologies when conducting quality control of medicines and medicinal plant raw materials, evaluate the obtained results. Organize the cultivation of medicinal plants and to carry out the preparation of medicinal plant raw materials.

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 330 academic hours. Classroom hours according to the types of studies: lectures – 33, practical classes – 185, student independent work (self-study) – 145 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	Number of academic hours						Form of intermediate assessment
		total	in class	including			out of class self studies	
				lectures	supervised student independent work	laboratory studies		
1-79 01 08 «Pharmacy»	5	120	97	15	6	76	23	credit
	6	210	88	9	3	76	122	examination
		330	185	24	9	152	145	

THEMATIC PLAN

Section (topic) name	Number of class hours	
	lectures	laboratory
1. General pharmacognosy	6	22,5
1.1. Introduction to pharmacognosy. Methods for pharmacognostic analysis of medicinal plant materials	4,5	18
1.2. Phytotherapy. Medicinal harvests. Herbal teas	1,5	4,5
2. Private pharmacognosy	27	129,5
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	4,5	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	1,5	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	1,5	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	18
2.13. Medicinal plants and medicinal plant raw materials, which contains various groups of biologically active substances	3	22
Total hours	33	152

CONTENT OF THE EDUCATIONAL MATERIAL

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.

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. Private 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.

**ACADEMIC DISCIPLINE CURRICULAR CHART OF THE EDUCATIONAL DISCIPLINE
«PHARMACOGNOSY»**

Section, topic #	Title of section, topic	Number of classroom hours		Supervised student independent work	Practical skill	Forms of control	
		lectures	laboratory			of practical skill	current / intermediate certification
5 semester							
	Lectures	15	-	6			
1	Introduction to pharmacognosy. Methods for pharmacognostic analysis of medicinal plant materials	1,5	-	3			tests
2	Polysaccharides. Medicinal plants and medicinal plant raw materials containing polysaccharides	1,5	-	-			
3	Vitamins. Medicinal plants and medicinal plant raw materials containing vitamins	1,5	-	-			
4	Terpenoids. Essential oils. Medicinal plants and medicinal plant raw materials containing aromatic essential oils, monoterpenes, sesquiterpenes	1,5	-	3			tests
5	Iridoids. Medicinal plants and medicinal plant raw materials containing iridoids	1,5	-	-			
6	Cardiac glycosides. Medicinal plants and medicinal plant raw materials containing cardiac glycosides	1,5	-	-			
7	Saponins. Medicinal plants and medicinal plant raw materials containing saponins	1,5	-	-			

8	Phenolglycosides. Lignans. Medicinal plants and medicinal plant raw materials containing phenol glycosides, lignans	1,5	-	-			
9	Anthracene derivatives. Medicinal plants and medicinal plant raw materials containing anthracene derivatives	1,5	-	-			
10	Coumarins and chromones. Medicinal plants and medicinal plant raw materials containing coumarins and chromones	1,5	-	-			
	Laboratory work	-	76	-			
1	Macroscopic analysis	-	4,5	-	Determination of the authenticity and quality of whole medicinal plant raw materials by the macroscopic method	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
2	Microscopic analysis	-	4,5	-	Determination of the authenticity of whole medicinal plant raw materials by microscopic method	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
3	Commodity analysis	-	4,5	-	Determination of the quality of medicinal plant raw materials by quantitative determination: permissible impurities	visual laboratory work, solving situational problems	defense of laboratory work
4	Final lesson on the topic «Methods of pharmacognostic analysis of medicinal plant materials»	-	4,5	-	Determination of the quality of medicinal plant raw materials by quantitative determination: permissible impurities	solving situational problems	tests *
5	Polysaccharides. Medicinal plants and medicinal plant raw materials containing polysaccharides	-	4,5	-	Determination of the quality of medicinal plant raw materials by quantitative determination:	visual laboratory work, interview, written reports on classroom	defense of laboratory work

					the main group of biologically active substances according to the section of the «Regulatory document on quality»	laboratory exercises	
6	Vitamins. Medicinal plants and medicinal plant raw materials containing vitamins	-	4,5	-	Determination of the authenticity of medicinal plant raw materials using thin layer chromatography. Quality of medicinal plant raw materials by quantitative determination: the main group of biologically active substances under the section «Regulatory document on quality»	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
7	Terpenoids. Essential oils. Medicinal plants and medicinal plant raw materials containing aromatic essential oils	-	4,5	-	Determination of the quality of medicinal plant raw materials by quantitative determination: the main group of biologically active substances according to the section of the «Regulatory document on quality»	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
8	Monoterpenes. Medicinal plants and medicinal plant materials containing monoterpenes	-	4,5	-	Determination of the authenticity and quality of whole medicinal plant raw materials by macroscopic and microscopic methods	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work

9	Sesquiterpenes. Medicinal plants and medicinal plant materials containing sesquiterpenes	-	4,5	-	Determination of the authenticity of medicinal plant raw materials using thin layer chromatography	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
10	Iridoids. Medicinal plants and medicinal plant raw materials containing iridoids	-	4,5	-	Determination of the authenticity of medicinal plant raw materials using thin layer chromatography	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
11	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	-	Determination of the authenticity of various types of medicinal plants and similar types of impurities. Determination of the authenticity and quality of whole medicinal plant raw materials by macroscopic and microscopic methods	interview	Tests*, assessment of the authenticity of herbarium specimens of medicinal plants; assessment of the authenticity and quality of samples of medicinal plant raw materials *
12	Cardiac glycosides. Medicinal plants and medicinal plant raw materials containing cardiac glycosides	-	4,5	-	Determination of the quality of medicinal plant raw materials by quantitative determination: the main group of biologically active substances according to the section of the «Regulatory Document on Quality». Determination of the authenticity of medicinal plant raw materials using thin layer chromatography	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work

13	Analysis of medicinal plant materials containing saponins	-	4,5	-	Determination of the quality of medicinal plant raw materials by quantitative determination: the main group of biologically active substances according to the section of the «Regulatory Document on Quality». Determination of the authenticity of medicinal plant raw materials using thin layer chromatography	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
14	Medicinal plants and medicinal plant materials containing saponins	-	4,5	-	Determination of the authenticity and quality of whole medicinal plant raw materials by macroscopic and microscopic methods	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
15	Phenolglycosides. Lignans. Medicinal plants and medicinal plant raw materials containing phenol glycosides, lignans	-	4,5	-	Determination of the authenticity of medicinal plant raw materials using thin layer chromatography	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
16	Anthracene derivatives. Medicinal plants and medicinal plant raw materials containing anthracene derivatives	-	4,5	-	Determination of the quality of medicinal plant raw materials by quantitative determination: the main group of biologically active substances according to the section of the «Regulatory Document on Quality». Determination of	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work

					the authenticity of medicinal plant raw materials using thin layer chromatography		
17	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	-	Determination of the authenticity of various types of medicinal plants and similar types of impurities. Determination of the authenticity and quality of whole medicinal plant raw materials by macroscopic and microscopic methods	interview	Tests*, assessment of the authenticity of herbarium specimens of medicinal plants; assessment of the authenticity and quality of samples of medicinal plant raw materials*, credit

6 semester

	Lectures	9	-	3			
1	Flavonoids. Medicinal plants and medicinal plant raw materials containing flavonoids	1,5	-	1,5			
2	Tannins. Medicinal plants and medicinal plant raw materials containing tannins	1,5	-	-			
3	Medicinal plants and medicinal plant raw materials containing alkaloids with nitrogen in the side chain, pyrrolizidine, tropane	1,5	-	-			
4	Medicinal plants and medicinal plant raw materials containing alkaloids, derivatives of quinolizidine, isoquinoline, indole, purines, steroids	1,5	-	-			
5	Medicinal plants and medicinal plant raw materials containing various groups of biologically active substances. Medicinal raw materials of animal and natural origin	1,5	-	1,5			
6	Phytotherapy. Medicinal harvests. Herbal teas	1,5	-	-			
	Laboratory exercises	-	76	-			
1	Coumarins and chromones. Medicinal plants and	-	4,5	-		visual laboratory	defense of laboratory

	medicinal plant raw materials containing coumarins and chromones				Determination of the authenticity of medicinal plant raw materials using thin layer chromatography	work, interview, written reports on classroom laboratory exercises	work
2	Analysis of medicinal plant materials containing flavonoids	-	4,5	-	Determination of the quality of medicinal plant raw materials by quantitative determination: the main group of biologically active substances according to the section of the «Regulatory Document on Quality». Determination of the authenticity of medicinal plant raw materials using thin layer chromatography	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
3	Medicinal plants and medicinal plant raw materials containing flavonoids of the flavone group	-	4,5	-	Determination of the authenticity and quality of whole medicinal plant raw materials by macroscopic and microscopic methods	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
4	Medicinal plants and medicinal plant raw materials containing flavonoids of the flavan group, chalcones, auronones, isoflavonoids	-	4,5	-	Determination of the authenticity of medicinal plant raw materials using thin layer chromatography.	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
5	Analysis of medicinal plant materials containing tannins	-	4,5	-	Determination of the quality of medicinal plant raw materials by quantitative determination: the main group of biologically active	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work

					substances according to the section of the «Regulatory document on quality»		
6	Medicinal plants and medicinal plant raw materials containing tannins	-	4,5	-	Determination of the authenticity of medicinal plant raw materials using thin layer chromatography	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
7	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	-	Determination of the authenticity of various types of medicinal plants and similar types of impurities. Determination of the authenticity and quality of whole medicinal plant raw materials by macroscopic and microscopic methods	interview	Tests*, assessment of the authenticity of herbarium specimens of medicinal plants; assessment of the authenticity and quality of samples of medicinal plant raw materials*
8	Analysis of medicinal plant materials containing alkaloids	-	4,5	-	Determination of the quality of medicinal plant raw materials by quantitative determination: the main group of biologically active substances according to the section of the «Regulatory Document on Quality».	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
9	Medicinal plants and medicinal plant materials containing alkaloids with nitrogen in the side chain, pyrrolizidine and tropane	-	4,5	-	Determination of the authenticity and quality of whole medicinal plant raw materials by macroscopic	visual laboratory work, interview, written reports on classroom	defense of laboratory work

					and microscopic methods	laboratory exercises	
10	Medicinal plants and medicinal plant raw materials containing alkaloids derivatives of quinolizidine, isoquinoline, indole, purine, steroid	-	4,5	-	Determination of the authenticity and quality of whole medicinal plant raw materials by macroscopic and microscopic methods	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
11	Medicinal plants and medicinal plant raw materials containing alkaloids derivatives of isoquinoline and indole	-	4,5	-	Determination of the authenticity of medicinal plant raw materials using thin layer chromatography	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
12	Medicinal plants and medicinal plant raw materials containing various groups of biologically active substances	-	4,5	-	Determination of the authenticity and quality of whole medicinal plant raw materials by macroscopic and microscopic methods	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
13	Medicinal raw materials of animal and natural origin	-	4,5	-	Determination of the quality of medicinal plant raw materials by quantitative determination: the main group of biologically active substances according to the section of the «Regulatory Document on Quality»	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
14	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	-	Determination of the authenticity of various types of medicinal plants and similar types of impurities. Determination of the authenticity and quality of whole medicinal plant raw materials by	interview	Tests*, assessment of the authenticity of herbarium specimens of medicinal plants; assessment of the authenticity and quality of samples of medicinal plant raw

					macroscopic and microscopic methods		materials*
15	Phytotherapy. Medicinal harvests. Herbal teas	-	4,5	-	Determination of the authenticity of various types of medicinal plants and similar types of impurities. Determination of the authenticity and quality of whole medicinal plant raw materials by macroscopic and microscopic methods	visual laboratory work, interview, written reports on classroom laboratory exercises	defense of laboratory work
16	Final lesson on the section «Private pharmacognosy»	-	4,5	-			defense of course work *
17	Final lesson in the sections «General pharmacognosy», «Particular pharmacognosy»	-	4	-	Determination of the quality of medicinal plant raw materials by quantitative determination: the main group of biologically active substances according to the section of the «Regulatory document on quality»	interview	defense of laboratory work *
		24	152	9			Exam

* is a mandatory form of current certification

INFORMATION AND INSTRUCTIONAL UNIT

LITERATURE

Basic (relevant):

1. Fundamentals of Pharmacognosy and Phytotherapy / M. Heinrich [etc.]; forewords by A. Douglas Kinghorn, M. Blumenthal. – 3rd ed. – [S. l.]: Elsevier, 2018. – 359 p.

Additional:

2. Pharmacognosy : Fundamentals, Applications and Strategy / ed. by Simone Badal, Rupika Delgoda. – Amsterdam [etc.]: Elsevier, 2017. – 716 p.

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

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

- preparation for lectures and practical exercises;
- preparation for the final lessons, credits and exam in the academic discipline;
- solution of situational tasks;
- test solving;
- preparation of thematic reports, abstracts, presentations;
- implementation of practical tasks;
- note-taking of educational literature;
- design of information and demonstration materials (stands, posters, graphics, tables, newspapers, etc.).

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

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

- preparation for lectures, laboratory classes;
- preparation for final classes, tests and exams;
- solving situational problems;
- carrying out research and creative tasks;
- preparation of presentations;
- taking notes from educational literature;
- compiling a review of scientific literature on a given topic;
- design of information and demonstration materials (stands, posters, graphs, tables, newspapers);
- compilation of a thematic selection of literary sources, Internet sources;
- studying instructions for the medical use of herbal medicines;
- study of collections of herbarium specimens of medicinal plants, specimens of medicinal plant raw materials.

The main forms of organizing managed independent work:

giving a report;
 studying topics and problems that are not covered in lectures;
 computer testing.

Control of controlled independent work is carried out in the form:

test work;
 final lesson, interview, testing;
 assessment of an oral answer to a question, message, report or solution to a problem.

LIST OF AVAILABLE DIAGNOSTIC TOOLS

The following forms are used for competence assessment:

interview;
 defense of laboratory work
 solving situational problems.
 tests;
 assessment of the authenticity of herbarium specimens of medicinal plants;
 assessment of the authenticity and quality of samples of medicinal plant raw materials.

LIST OF AVAILABLE TEACHING METHODS

Traditional method;

active (interactive) methods:

problem-based learning PBL (Problem-Based Learning);
 team-oriented training TBL (Team-Based Learning);
 science-based learning RBL (Research-Based Learning);
 simulation-based training.

LIST OF PRACTICAL SKILLS

Name of practical skills	Form of practical skills control
1. Determination of the authenticity and quality of whole medicinal plant raw materials by macroscopic and microscopic methods	visual laboratory work, interview, written reports on classroom laboratory exercises
2. Determination of the authenticity of medicinal plant raw materials by thin layer chromatography	visual laboratory work, interview, written reports on classroom laboratory exercises
3. Determination of the quality of medicinal plant raw materials by quantitative determination: the main group of biologically active substances under the section «Regulatory document on quality»	visual laboratory work, interview, written reports on classroom laboratory exercises
4. Determination of the quality of medicinal plant raw materials by quantitative determination: permissible impurities	visual laboratory work, solving situational problems

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

**PROTOCOL OF THE CURRICULUM APPROVAL
BY OTHER DEPARTMENTS**

Title of the discipline requiring approval	Department	Amendments to the curriculum in the academic discipline	Decision of the department, which designed the curriculum (date, protocol #)
1. Pharmaceutical chemistry	Department of Pharmaceutical Chemistry	No	protocol # 13 of 14.06.2024
2. Pharmacy technology of drugs	Department of Pharmaceutical Technology	No	protocol # 13 of 14.06.2024

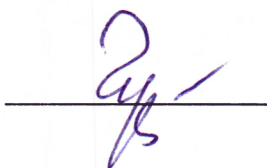
COMPILERS/AUTHORS:

Head of the Department of Pharmacy Organization of the educational institution «Belarusian State Medical University», Ph.D, Associate Professor



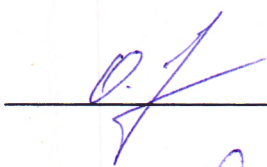
V.V.Mushkina

Dean of the faculty of Pharmacy of the educational institution «Belarusian State Medical University», PhD, Professor



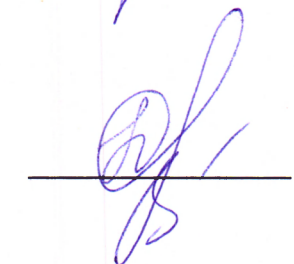
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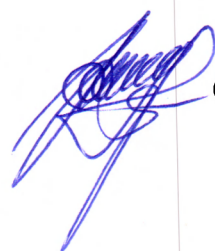


Y.V.Tretsiakova

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

Dean of the Medical Faculty for International Students of the educational institution «Belarusian State Medical University»

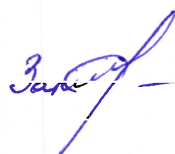
24.06.2024



O.S.Ishutin

Methodologist of the Educational and Methodological Department of the Office of Educational Activities of the educational institution «Belarusian State Medical University»

24.06.2024



S.V.Zaturanova