



SYLLABUS OF THE EDUCATIONAL COMPONENT

PHARMACEUTICAL BOTANY

for applicants for higher education of the 1st and 2nd years of study full-time higher education
 educational programme "Pharmacy"
 specialty "226 Pharmacy, industrial pharmacy"
 field of knowledge "22 Healthcare"
 training for second (master's) level of higher education
 specialization 225.01 Pharmacy

TEACHERS

Information about the teacher

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1. The name of higher education establishment and department: the National University of Pharmacy, Pharmacognosy and Nutciology department

2. Address of the department: Kharkiv, street Valentinovskaya, 4, 4th floor, phone numb. +38(0572)67-93-63.

3. Web site of the department: <https://cnc.nuph.edu.ua/>

4. Consultations take place online according to the schedule posted on the website of the Department of Pharmacognosy and Nutrition every Thursday from 12.10 to 12.50. Consultations are conducted by a teacher who reads the educational component.

5. Brief summary of the educational component: The educational component "Pharmaceutical botany" is a mandatory educational component for the second (master's) level in the specialty 226 "Pharmacy, industrial pharmacy" of the educational programme "Pharmacy". After studying the educational component, higher education applicants will get knowledge about medicinal plants, their anatomical and morphological structure, the basics of life, reproduction, geographical distribution, classification, applications, basics of ecology, structure, development and placement of plant communities on the globe.

6. The purpose statement of studying the educational component: to provide basic theoretical knowledge, practical skills and abilities in botany, which are necessary during the analysis of medicinal plant raw materials, determination of macro- and microscopic diagnostic signs, systematic belonging of medicinal plant species, conditions of their growth and use in medicine.

7. Competences in accordance with the educational programme:

Soft-skill / general: GC 12. Ability to conduct research at an appropriate level.

Hard-skill / Professional (special) competences (PC):

PC 2. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy.

PC 10. The ability to ensure the proper storage of medicines and other products of the pharmacy assortment in accordance with their physicochemical properties and the rules of Good Storage Practice (GSP) in healthcare facilities.

8. The programme learning outcomes: (PLO):

PLO 17. Predict and determine the impact of environmental factors on the quality and consumer characteristics of medicinal products of natural and synthetic origin and other products of the pharmacy assortment, organize their storage in accordance with their physicochemical properties and the rules of Good Storage Practice (GSP).

9. Status of the educational component: compulsory.

10. Prerequisites of the educational component: in order to successfully study and acquire competencies from the educational component "Pharmaceutical Botany", the higher education applicant needs the knowledge obtained during the study of the educational components "Biology with the basics of genetics", "General and inorganic chemistry", "Organic chemistry", "English language", "Latin language in Pharmacy".

11. The volume of the educational component: 7 ECTS credits, 210 hours, of which lectures – 18 hours, practical classes – 76 hours, independent work – 116 hours.

12. Organization of training

Teaching methods:

- *explanatory (informational and reproductive) method*: Lecture-based learning – lectures, video materials;
- *reproductive method*: traditional practical classes;
- *problem-based teaching*: Brainstorming – "brainstorming" method; Case-based learning – case method;
- *partial search method*: Game-based learning – game methods of learning (business games); Team-based learning
- method of working in small groups;
- *research method*: Research-based learning – participation in research work, preparation of theses of conference reports, scientific articles.

Content of the educational component:

Модуль 1. *Anatomy and morphology of vegetative organs of plants*

Content module 1. *Structural-functional, and chemical features of plant cells and tissues, their signs that have diagnostic significance*

Topic 1. Introduction to pharmaceutical botany. Fundamentals of botanical microtechnique.

Topic 2. Modern understanding of the structure of a plant cell. Structures of a plant cell that have diagnostic significance in microscopic analysis of plant raw materials.

Topic 3. Vacuoles and cell sap.

Content module 2. *Structural-functional, and chemical features of tissues, their signs that have diagnostic significance*

Topic 4. Plant tissue and their classification.

Topic 5. Structural-functional and topographic characteristics of meristematic, covering, basic and secretory tissues.

Topic 6. Structural-functional and topographic characteristics of mechanical and conducting tissues. Conductive bundles.

Content module 3. *Morphological and anatomical structure and functions of vegetative plant organs*

Topic 7. Introduction to morphology and anatomy of plants. Plant organs and integrity of a plant organism. Propagation of plants.

Topic 8. Anatomy of the root. Anatomy of the stem and rhizome of monocots.

Topic 9. Anatomy of the stem and rhizome of dicots. Anatomy of the stem of arboreal plants.

Topic 10. Anatomical structure of the leaf.

Topic 11. Morphology of the roots and shoots and their metamorphoses. Vegetative propagation.

Module 2. *Morphology of generative organs of plants. A systematic review of some families of medicinal plants and mushrooms with elements of phytoecology and phytocenology*

Content module 4. *Structure and function of generative organs of plants, their taxonomic and diagnostic signs. Sexual propagation of plants*

Topic 12. Generative organs of the plant. Morphology of the flower and inflorescence.

Topic 13. Sexual propagation of flowering plants.

Topic 14. Morphology of the fruit, seed and collective fruit.

Content module 5. *Systematics of plants. An overview of some families of Ranunculidae, Caryophyllidae, Dilleniidae, and Rosidae subclasses, and their medicinal representatives*

Topic 15. Introduction to plant taxonomy. Fundamentals of botanical classification. Angiosperms. System of Magnoliophyta.

Topic 16. An overview of Brassicaceae and Leguminosae families and their medicinal representatives.

Topic 17. An overview of Ericaceae and Rosaceae families and their medicinal representatives.

Topic 18. An overview of Polygonaceae and Apiaceae families and their medicinal representatives.

Topic 19. An overview of Poaceae family and its medicinal representatives.

Content module 6. *An overview of some families of Lamiidae, Asteridae, and Liliidae subclasses and their medicinal representatives, some medicinal representatives of monocotyledons and dicotyledons, gymnosperms, ferns, algae, fungi, and lichens classes.*

Elements of phytoecology and geobotany

Topic 20. An overview of Solanaceae and Lamiaceae families and their medicinal representatives.

Topic 21. An overview of Asteraceae family and its medicinal representatives.

Topic 22. An overview of flowering medicinal plants of different families common in Ukraine.

Topic 23. An overview of medicinal representatives of gymnosperms, ferns, algae, fungi, and lichens common in Ukraine.

Topic 24. Elements of phytocology and geobotany. Protection of flora, rational use and preservation of medicinal plant resources.

Organization of independent work:

Independent work includes the study of topics 1, 7, 13, 15, 24 of the educational component, which were not included in classroom classes, and the completion of tasks on these topics in order to consolidate the theoretical material.

13. Forms and types of academic achievements supervision:

Forms and types of academic achievements supervision:

Progress supervision: theoretical and practical knowledge are in the form of an oral examination of the performance of tasks of extracurricular independent work; selective oral survey; written control of assimilation of the material of the topic of each lesson, individual sections of the educational component, content modules; computer control of Licensing Exam tests on content module topics; oral defense of educational and research work.

Supervision of content modules: is conducted in the last classes of studying topics of content modules. The form of knowledge diagnosis of higher education applicants is written control and testing based on the test base of the licensing exam Krok 1 (botany).

Semester exam: answers to test questions (theoretical part); description of objects and medicinal plants in accordance with the proposed points (practical part).

Semester control form: semester credit, semester exam.

Conditions for admission to the supervision of content modules: applicants of higher education who have attended all practical classes or completed missed classes and completed all types of work provided for by the work programme of the educational component are allowed to control the content modules.

Conditions for admission to semester supervision: applicants of higher education who have attended all practical classes or made up for missed classes, completed all types of work provided for in the work programme of the educational component, and when studying the content module (modules) have scored a number of points not less than the minimum (current rating) are admitted (the semester control is more than 60 points).

14. Evaluation system of the educational component

Evaluation of mastering the topics of the educational component during classes:

<i>Topic number of the educational component</i>	<i>The maximum number of points on topic</i>	<i>Distribution of the maximum number of points on topic by type of work</i>	<i>Types of work for which the applicant receives points</i>
Content module 1.			
<i>Topic 1. (topic for independent study)</i>	2	1	testing
		1	oral answer
<i>Topic 2.</i>	5	1	testing
		4	oral answer
<i>Topic 3.</i>	9	4	oral answer
		5	solving situational tasks
Total points for the content module 1:		16	
Content module 2.			
<i>Topic 4.</i>	3	1	testing
		2	oral answer
<i>Topic 5.</i>	4	2	testing
		2	oral answer
<i>Topic 6.</i>	10	5	oral answer
		5	solving situational tasks
Total points for the content module 2:		17	
Content module 3.			
<i>Topic 7. (Topic for independent study)</i>	3	1	testing
		2	oral answer

Topic 8.	5	2	testing
		3	oral answer
Topic 9.	8	3	testing
		5	oral answer
Topic 10.	13	3	testing
		5	oral answer
		5	solving situational tasks
Topic 11.	8	3	testing
		5	oral answer
Total points for the content module 3:		37	
Total points for the module 1:		70	
Content module 4.			
Topic 12.	7	3	testing
		4	oral answer
Topic 13. (Topic for independent study)	3	1	testing
		2	oral answer
Topic 14.	10	5	oral answer
		5	solving situational tasks
Total points for the content module 4:		20	
Content module 5.			
Topic 15. (Topic for independent study)	3	1	testing
		2	oral answer
Topic 16.	4	4	oral answer
Topic 17.	4	4	oral answer
Topic 18.	4	4	oral answer
Topic 19.	10	5	oral answer
		5	compilation of the herbarium minimum
Total points for the content module 5:		25	
Content module 6.			
Topic 20.	5	5	oral answer
Topic 21.	6	2	testing
		4	oral answer
Topic 22.	5	5	oral answer
Topic 23.	6	2	testing
		4	oral answer
Topic 24. (Topic for independent study)	3	3	testing
Total points for the content module 6:		25	
Total points for the module 2:		70	

Evaluation of applicants by types of work during classes Module 1:

<i>Types of work, for which the acquirer receives points</i>	<i>Maximum number of points</i>
testing	17
answers to theoretical questions	38
solving situational tasks	15
Total points:	70

Evaluation during the control of Content modules 1-3

<i>Types of work, for which the acquirer receives points</i>	<i>Розподіл максимальної кількості балів за контроль змістового модуля за видами робіт</i>	<i>Maximum number of points за контроль змістового модуля</i>

<i>Content module 1</i>		
testing	4	9
answers to theoretical questions	5	
<i>Content module 2</i>		
testing	4	8
answers to theoretical questions	4	
<i>Content module 3</i>		
testing	4	13
answers to theoretical questions	9	
Total points за контроль змістових модулів 1-3:		30

Evaluation of applicants by types of work during classes Module 2:

<i>Types of work, for which the acquirer receives points</i>	<i>Maximum number of points</i>
testing	12
answers to theoretical questions	48
solving situational tasks	5
compilation of the herbarium minimum	5
Total points:	70

Evaluation during the control of content modules 4-6:

<i>Types of work, for which the acquirer receives points</i>	<i>Distribution of the maximum number of points for control of the content module by types of works</i>	<i>Maximum number of points for control the content module</i>
<i>Content module 4</i>		
testing	4	10
answers to theoretical questions	6	
<i>Content module 5</i>		
testing	2	5
answers to theoretical questions	3	
<i>Content module 6</i>		
testing	4	15
answers to theoretical questions	6	
compilation of the herbarium minimum	5	
Total points for control of Content modules 4-6:		30

Evaluation of independent work of the student of education:

during the current control (Module 1): 5 points: 2 points - testing (topics 1, 7), 3 points - oral response (topics 1, 7)

during Content module control: tickets for Content module 1 include theoretical questions and test tasks from topic 1

during the control of Content module 3: tickets for Content module 3 include tasks from topic 7

during the current control (Module 2): 9 points: 5 points - testing (topics 13, 15, 24), 4 points - oral response (topics 13, 15, 24)

during Content module 4 control: tickets for Content module 4 include theoretical questions and test tasks on topic 13

during the control of Content module 4: tickets for Content module 3 include tasks from topic 13

during the control of content module 5: tickets for Content module 4 include theoretical questions and test tasks on topic 15

during the control of Content module 5: tickets for Content module 3 include tasks from topic 15
 during the control of Content module 6: tickets for Content module 4 include theoretical questions and test tasks on topic 24
 during the control of Content module 6: tickets for Content module 3 include tasks from topic 24

Evaluation scale of the semester credit:

When studying the educational component, several assessment scales are used: a 100-point scale, an undifferentiated (“passed”, “not passed”) two-point scale and the ECTS rating scale. The results are converted from one scale to another according to the table.

Total points on a 100-point scale	Scale ECTS	Evaluation on a non-differentiated scale
90-100	A	passed
82-89	B	
74-81	C	
64-73	D	
60-63	E	
35-59	FX	not insured
1-34	F	

15. Academic policies of the educational component:

Academic Integrity Policy. It is based on the principles of academic integrity stated in the POL "On measures to prevent cases of academic plagiarism at the National University of Pharmacy". Cheating during the evaluation of an applicant for higher education during supervision activities in practical (seminar, laboratory) classes, supervision of content modules and the semester exam is prohibited (including the use of mobile devices). Abstracts must have correct text references to the used literature. The detection of signs of academic dishonesty in the student's written work is a reason for the teacher not to credit it.

Class attendance policy. An applicant for higher education is obliged to attend classes (POL "On the organization of the educational process of the National University of Pharmacy ") according to the schedule (<https://nuph.edu.ua/rozklad-zanyat/>), to observe ethical norms of behavior.

Policy regarding deadlines, working out, rating increase, liquidation of academic debts. The completion of missed classes by an applicant for higher education is carried out in accordance with the POL "Regulations on the completion of missed classes by applicants and the procedure for eliminating academic differences in the curricula of the National University of Pharmacy" in accordance with the schedule for working out missed classes established by the department. Increasing the rating and liquidating academic debts from the educational component is carried out by the applicants in accordance with the procedure specified in the POL "On the procedure for evaluating the results of training of applicants for higher education at the National University of Pharmacy ". Applicants of higher education are obliged to comply with all deadlines set by the department for the completion of written works from the educational component. Works that are submitted late without valid reasons are assessed at a lower grade - up to 20% of the maximum number of points for this type of work.

Policy on appeals of evaluation of the educational component (appeals). Applicants for higher education have the right to contest (appeal) the evaluation of the educational component obtained during control measures. The appeal is carried out in accordance with the POL "Regulations on appealing the results of the final supervision of knowledge by applicants of higher education at the National University of Pharmacy".

16. Information and educational and methodical support of the educational component:

The main reading suggestions	<ol style="list-style-type: none"> 1. Pharmaceutical botany : textbook / Т. М. Gontova [et al.]; edited by Т. М. Gontova. – Ternopil : TSMU , 2013. – 380 p. 2. Сербін, А. Г. Фармацевтична ботаніка : підруч. для вузів / А. Г. Сербін, Л. М. Сіра, Т. О. Слободянюк ; за ред. Л. М. Сірої. – Вінниця : Нова Книга, 2015. – 488 с.
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	<p>3. Test items with explains for preparing for license examination KROK-1 “Pharmacy” (BOTANY) / [Gontova T. M., Kriukowa Ya. S., Garonenko V. P., Mashtaler V. V., Mala O. S.]; under the editorship of Kriukowa Ya. S. – Kh.: NUPh, 2017. – 91 p.</p> <p>4. Фотогербарий лекарственных растений=Photoherbarium of medicinal plants : учеб. пособие для студентов вузов / Т. Н. Гонтовая [и др.]; под общ. ред. Т. Н. Гонтовой, В. П. Руденко. – Харьков : НФаУ : Золотые страницы, 2017. – 240с.</p> <p>5. Гонтова, Т. М. Фармацевтична ботаніка : зб. тестових завдань з поясненнями для підготовки до ліцензійного іспиту КРОК 1 (двомовний) = Collection of tests with explanations in preparation for licensing examination KROK 1 (bilingual) : навч.-метод. посіб. Для здобувачів вищої освіти закладів вищ. освіти / уклад.: Т. М. Гонтова [та ін.] ; за ред. Т. М. Гонтової. – Харків : НФаУ, 2024. – 307 с.</p> <p>6. Фармацевтична ботаніка: навчально-методичний посібник для здобувачів вищої освіти спеціальності «226 Фармація, промислова фармація» ОП «Фармація», «Клінічна фармація, «Технології парфумерно-косметичних засобів», «Технології фармацевтичних препаратів» / Т.М. Гонтова, В.В. Машталер, С.В. Романова, Н.В. Бородіна . – Харків : НФаУ, 2024. – 215 с.</p>
<p>Supplementary reading suggestions for in-depth study of the educational component</p>	<p>1. Гонтова Т. М. Фармацевтична ботаніка. Анатомія, морфологія та систематика рослин з основами фітоєкології і фітоценології: метод. рек. до викон. аудит. та позааудит. роботи / Т. М. Гонтова, В. П. Руденко, О. В. Філатова. – Харків : НФаУ, 2019. – 119 с.</p> <p>2. Пішак, В. П. Фармацевтична ботаніка : Морфологія / В. П. Пішак, В. В. Степанчук. – Чернівці : Медуніверситет, 2013. – 224 с.</p> <p>3. Фармацевтична енциклопедія / гол. ред. ради та автор передмови В. П. Черних. – 3-тє вид. перероб. і допов. – К. : «МОРІОН», 2016. – 1952 с.</p> <p>4. Державна Фармакопея України. Доповнення 2 / ДП «Український науковий фармакопейний центр якості лікарських засобів». – 2-ге вид. – Харків : ДП «Український науковий фармакопейний центр якості лікарських засобів», 2018. – 336 с.</p> <p>5. Державна Фармакопея України. Доповнення 3 / ДП «Український науковий фармакопейний центр якості лікарських засобів». – 2-ге вид. – Харків : ДП «Український науковий фармакопейний центр якості лікарських засобів», 2018. – 416 с.</p> <p>6. Державна Фармакопея України. Доповнення 4 / ДП «Український науковий фармакопейний центр якості лікарських засобів». – 2-ге вид. – Харків : ДП «Український науковий фармакопейний центр якості лікарських засобів», 2020. – 600 с.</p> <p>Державна Фармакопея України. Доповнення 5 / ДП «Український науковий фармакопейний центр якості лікарських засобів». – 2-е вид. – Харків: ДП «Український науковий фармакопейний центр якості лікарських засобів», 2021. – 424 с.</p>
<p>Current electronic information resources (magazines, websites) for in-depth study of the educational component</p>	<p>Сайт фармакогнозії та нутріціології. – http://cnc.nuph.edu.ua Наукова бібліотека НФаУ – http://lib.nuph.edu.ua Електронний архів НФаУ – http://dSPACE.nuph.edu.ua Національна бібліотека України імені В. І. Вернадського – http://www.nbuv.gov.ua НФаУ. Тести on-line – http://tests.nuph.edu.ua/</p>
<p>Moodle distance learning system</p>	<p>Центр дистанційних технологій НФаУ https://pharmel.kharkiv.edu/moodle/course/view.php?id=1086</p>

17. Technical support and software of the educational component: computers for testing, multimedia device, screen, Wi-Fi network, Moodle platform. There are also microscopes with electric lighting, Biolam microscopes, MBR-9 stereomicroscopes for the educational process, Wi-Fi network, Moodle platform.