MINISTRY OF HEALTH OF UKRAINE
NATIONAL UNIVERSITY OF PHARMACY
Faculty of Pharmacy
Department of Pharmacognosy and Nutriciology

INDUSTRIAL PHARMACEUTICAL PRACTICE IN PHARMACOGNOSY WITH THE BASICS OF RESOURCE SCIENCE

РОБОЧА ПРОГРАМА
освітнього компонента

training for the second (master's) level
(Higher Educational Level Name)
specialty «226 Pharmacy, Industrial Pharmacy»
(Code and Specialty Name)
knowledge industry «22 Healthcare»
(Code and Knowledge Field Name)
of educational program «Pharmacy»
(Educational Program Name)

2024

The work program of the educational component "Industrial pharmaceutical practice in pharmacognosy with the basics of resource science" in specialty 226 «Pharmacy, Industrial pharmacy» educational program «Pharmacy» (4.10д)англ for applicants for higher education 5 year of study.

Developers:
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Work program were reviewed at the Department of Pharmacognosy and Nutriciology meeting
Record from « 2 » of September 2024 № 15.

Head of the Department _____ Prof. Viktoriia KYSLYCHENKO

Work program has been approved at the meeting of the Methodical Commission of chemical disciplines session
Record from « 5 » of September 2023 № 1

Head of the Specialized Committee _____ Prof. Viktoriya GEORGIYANTS

1. Description of the educational component

Language of instruction: ***English***

Status of the component: *selective*

Prerequisites for studying the educational component:

a) a) is based on the knowledge acquired by higher education students in the study of Latin, botany, pharmacognosy, organic chemistry, biological chemistry, analytical chemistry, biophysics, physical and colloidal chemistry, normal and pathological human physiology;

b) b) lays the foundations for the study of pharmaceutical and toxicological chemistry, pharmacology, drug technology, perfumery and cosmetic technology, and clinical pharmacy by higher education students, which involves the integration of teaching with these disciplines and the formation of skills to apply knowledge of pharmacognosy in the process of further education and in professional activities.

The subject of study of the educational component "Industrial pharmaceutical practice in pharmacognosy with the basics of resource science" is the study of data on the procurement, storage, and processing of medicinal plant and medicinal plant materials used in perfumery and cosmetics, the care of cultivated medicinal plants, and the identification of thickets of wild medicinal plants.

Information volume of the educational component. The educational component is allocated 90 hours 3 ECTS credits.

2. Objectives and tasks of the educational component

The purpose of teaching the educational component "Industrial pharmaceutical practice in pharmacognosy with the basics of resource science" is to teach higher education students to identify the medicinal products and morphologically similar species, to prepare the medicinal products, to carry out primary processing, drying, commodity analysis of medicinal products, which is necessary in the practical activities of a pharmacist; to provide practical skills in cultivation of medicinal plants, detection of wild plants, familiarization with the methods of studying the reserves of medicinal plants and providing recommendations for the rational use of natural resources.

The main tasks of the educational component "Industrial pharmaceutical practice in pharmacognosy with the basics of resource science" are:

- get acquainted with the history of the organization or enterprise on the basis of which practical work is carried out;
- study the range of cultivated medicinal plants, methods of introduction and selection of individual crops, basic agrotechnical techniques for growing medicinal plants;
- study the organization of medicinal plant material procurement, documentation on receiving medicinal plant material from procurers, storage conditions of medicinal plant;
- get acquainted with wild, tropical and subtropical medicinal plants, which are a source for obtaining biologically active substances that form the basis of phytocosmetics;
- learn the concepts of identity and good quality of medicinal plant material;
- explain the methods of procurement, drying, storage of medicinal plant depending on morphological groups and classes of BAC;
- apply the characteristics of medicinal plants and medicinal plant material in professional activities;
- develop a plan of measures for the rational procurement of raw materials;
- apply knowledge of the chemical composition of MRM when collecting, storing and analyzing raw materials of plant and animal origin and preparations;
- draw a conclusion about the quality of raw materials based on the results of pharmacopoeial analysis;
- interpret the relationship between the chemical structure of BAC and pharmacological action;
- develop information sheets, make reports for doctors and provide consultations to the population on issues related to medicinal plants, raw materials and preparations of natural origin.

3. Competencies and planned learning outcomes

The educational component "Industrial pharmaceutical practice in pharmacognosy with the basics of resource science" ensures the acquisition of **competencies** by students:

- *integral:* ability to solve research and/or innovation problems in the field of pharmacy
- ***general:***

GC 02. Knowledge and understanding of the subject area and understanding of professional activity

GC 03. Ability to communicate in the state language both orally and in writing.
GC 05. Ability to evaluate and ensure the quality of work performed.
GC 06. Ability to work in a team.
GC 09. Ability to use information and communication technologies.
GC 11. Ability to apply knowledge in practical situations, make informed decisions.

- ***professional:***

PC 1. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts.
PC 2. Ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy.
PC 3. Ability to solve pharmacy problems in new or unfamiliar environments with incomplete or limited information, taking into account aspects of social and ethical responsibility.
PC 4. Ability to clearly and unambiguously communicate one's own knowledge, conclusions and reasoning in the field of pharmacy to specialists and non-specialists, in particular to students.
PC 6. Ability to provide advice on prescription and non-prescription medicines and other pharmacy products; pharmaceutical care during the selection and sale of an over-the-counter medicinal product by assessing the risk/benefit ratio, compatibility, indications and contraindications, guided by data on the health status of a particular patient, taking into account the biopharmaceutical, pharmacokinetic, pharmacodynamic and physicochemical characteristics of the medicinal product and other pharmaceutical products.
PC 10. Ability to ensure proper storage of medicinal products and other pharmaceutical products in accordance with their physicochemical properties and the rules of Good Storage Practice (GSP) in healthcare institutions.
PC 17. Ability to carry out pharmaceutical development and participate in the production of medicinal products of natural and synthetic origin in pharmaceutical enterprises in accordance with the requirements of Good Manufacturing Practice (GMP).
PC 19. Ability to organize and carry out quality control of medicinal products of natural and synthetic origin in accordance with the requirements of the current edition of the State Pharmacopoeia of Ukraine, quality control methods, technological instructions, etc.; prevent the distribution of low-quality, falsified and unregistered medicines.
Integrative final ***programmatic learning outcomes*** (PLO), the formation of which is facilitated by the educational component:
PLO 1. Have and apply specialized conceptual knowledge in the field of pharmacy and related fields, taking into account modern scientific achievements.
PLO 2. Critically understand scientific and applied problems in the field of pharmacy.
PLO 3. Have specialized knowledge and skills to solve professional problems and tasks, including for the purpose of further developing knowledge and procedures in the field of pharmacy.
PLO 4. Communicate fluently in the state and English languages orally and in writing to discuss professional problems and results of activities, present scientific research and innovative projects.
PLO 5. Evaluate and ensure the quality and efficiency of activities in the field of pharmacy.
PLO 7. Collect the necessary information on the development and production of medicines, using professional literature, patents, databases and other sources; systematize, analyze and evaluate it, in particular, using statistical analysis.
PLO 8. Formulate, argue, clearly and specifically convey to specialists and non-specialists information based on their own knowledge and professional experience, the main trends in the development of world pharmacy and related industries.
PLO 9. Carry out professional activities using information technologies, "Information databases", navigation systems, Internet resources, software and other information and communication technologies.
PLO 12. Determine the advantages and disadvantages of medicines of natural and synthetic origin of various pharmacological groups, taking into account their chemical, physicochemical, biopharmaceutical, pharmacokinetic and pharmacodynamic characteristics and the type of dosage form. Recommend medicines and other pharmacy products to consumers with the provision of advisory assistance and pharmaceutical care.
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 pharmacy products, organize their storage in accordance with their physicochemical properties and the rules of Good Storage Practice (GSP).
As a result of studying the educational component, the student should know:

- characteristics of the raw material base of medicinal plants (wild and cultivated);
- regulatory and legal framework for the use of wild-growing resources of medicinal plants at the present stage;
- nomenclature of medicinal products, medicinal products of plant and animal origin, which are approved for use in pharmacy;
- basic information on the distribution and places of growth of medicinal products used in pharmacy;
- the influence of geographical and environmental factors on the productivity of drugs; variability of the chemical composition of drugs;
- macroscopic and microscopic methods of analysis of whole, crushed and briquetted medicinal plant materials;
- morphological and anatomical features of the MPM approved for use in medical practice; possible impurities;
- the main differences between the official MPM and possible impurities;
- optimal terms of preparation of medicinal products;
- organization of harvesting of medicinal products;
- methods of harvesting different morphological groups of forestry products;
- system of rational use of natural resources, protection and reproduction of forest resources;
- general rules of harvesting of forest resources and measures to protect natural exploitation thickets of forest resources;
- the basics of industrial cultivation of forests;
- primary processing, drying, bringing to the standard state of the MPM;
- requirements for packaging, labeling, transportation and storage of forest products in accordance with the quality control methods;
- the system of standardization and certification of herbal medicines and phytopreparations in Ukraine; documentation of the results of the analysis of herbal medicines; legal significance of the certificate;
- main areas of application of medicinal products of plant and animal origin in medicine;
- safety rules for working with MP and MPM.

be able to:

– determine by morphological features of MP in living and herbarium form;
– identify MPM based on microscopic analysis;
– be able to detect MP thickets in nature;
– establish optimal terms for MPM harvesting;
– carry out harvesting and drying, primary processing and storage of MPM;
– herbariumize medicinal MP and morphologically similar species,
– recognize impurities of morphologically similar plant species during collection, acceptance and certification of raw materials;
– – apply basic methods of growing cultivated MP;
– – provide recommendations on the rational use of specific medicinal plant thickets;
– – bring to a standard state;
– – carry out acceptance of MPM and select samples necessary for its analysis, in accordance with the quality control methods;
– – carry out commodity analysis;
– – carry out statistical processing and registration of analysis results.

to have:

a higher education degree (master's degree) applicant must have general (GC 02, 03,05, 06, 09, 11) and special (professional) (PC 1, 2, 3, 4, 6, 10, 17, 19) competencies (expected learning outcomes).

4. The structure of the educational component

Names of content modules and topics	The amount of hours			
	full time study (4,10д)*			
	the whole amount	including		
		l.	pract.	self-study
Module 1: Acquisition of skills in the procurement, storage and processing of medicinal plant raw materials and raw materials used in pharmacy, care of cultivated medicinal plants and plants used in pharmacy. Determination of stocks of medicinal plants, rational use of natural resources.				
Content module №. 1. Procurement, storage and processing of medicinal plant materials and raw materials used in pharmacy.				
Topic 1: Acquaintance with the program, calendar, tasks and practice base.	10,0	-	-	105,0
Topic 2. Acquaintance with wild medicinal plants in various phytocenoses. Morphological description and definition of medicinal plants. Herbalization of medicinal plants.	20,0	-	-	20,0
Topic 3. Acquaintance with the organization of procurement of MPM. Mastering the methods of harvesting, drying, bringing MPM to a standard state, packing and labeling MPM.	10,0	-	-	10,0
Topic 4. Mastering the express method of phytochemical analysis. Commodity analysis of a sample of MPM prepared individually.	20,0	-	-	20,0
Total for content module 1	60,0	-	-	60,0
Content module № 2. Care of cultivated medicinal plants and detection of thickets of wild medicinal plants				
Topic 5. Acquaintance with the main cultivated medicinal plants and methods of their cultivation.	20,0	-	-	20,0
Topic 6. Getting to know the basics of studying stocks of wild medicinal plants with the aim rational use of natural resources of Medicinal plants and their protection.	10,0	-	-	10,0
Total for content module 2	30,0	-	-	30,0
Total for Module 1	**90,0**	**-**	**-**	**90,0**

5. The content of the educational component programme

Module 1: ***Acquisition of skills in the procurement, storage and processing of medicinal plant raw materials and raw materials used in pharmacy, care of cultivated medicinal plants and plants used in pharmacy. Determination of stocks of medicinal plants, rational use of natural resources.***

Content module № 1. Procurement, storage and processing of medicinal plant materials and raw materials used in pharmacy.
Topic 1. Acquaintance with the program, calendar, tasks and practice base.
Topic 2. Acquaintance with wild medicinal plants in various phytocenoses. Morphological description and definition of medicinal plants. Herbalization of medicinal plants.
Topic 3. Acquaintance with the organization of procurement of MPM. Mastering the methods of harvesting, drying, bringing MPM to a standard state, packing and labeling MPM.
Topic 4. Mastering the express method of phytochemical analysis. Commodity analysis of a sample of MPM prepared individually.

Content module № 2. Care of cultivated medicinal plants and detection of thickets of wild medicinal plants
Topic 5. Acquaintance with the main cultivated medicinal plants and methods of their cultivation.
Topic 6. Introduction to the basics of studying wild medicinal plant stocks for the purpose of rational use of natural resources of the Republic of Latvia and their protection.

6. Lecture topics

Not provided for in the working curriculum.

7. Seminar topics

Not provided for in the working curriculum.

8. Topics of practical classes

№	Name of topic	The amount of hours
1	Introduction with the program, calendar, tasks and practice base	–
2	Introduction to wild medicinal plants in different phytocoenoses. Morphological description and identification of medicinal plants. Herbarization of medicinal plants	–
3	Introduction with the organization of harvesting of wood products. Mastering the methods of harvesting, drying, bringing the MPM to a standard state, packaging and labeling of MPM	–
4	Mastering the express method of phytochemical analysis. Commodity analysis of a sample of individually harvested forest products	–
5	Acquaintance with the main cultivated medicinal plants and methods of their cultivation.	–
6	Getting to know the basics of studying stocks of wild medicinal plants with the aim rational use of natural resources of Medicinal plants and their protection.	–
	Semester differential credit for module 1	**1**
	The whole amount of hours	**90,0**

9. Topics of laboratory classes

Not provided for in the working curriculum.

10. Individual work

№	Name of topic	The amount of hours
1	Introduction with the program, calendar, tasks and practice base	10
2	Introduction to wild medicinal plants in different phytocoenoses. Morphological description and identification of medicinal plants. Herbarization of medicinal plants	20
3	Introduction with the organization of harvesting of wood products. Mastering the methods of harvesting, drying, bringing the MPM to a standard state, packaging and labeling of MPM	10
4	Mastering the express method of phytochemical analysis. Commodity analysis of a sample of individually harvested forest products	20
5	Acquaintance with the main cultivated medicinal plants and methods of their cultivation.	20
6	Getting to know the basics of studying stocks of wild medicinal plants with the aim rational use of natural resources of Medicinal plants and their protection.	9
	The whole amount of hours	**90,0**

Theoretical questions and tasks for individual work

1. Familiarize yourself with the data from the main and auxiliary literature on the characteristics of the studied drugs and plants used in pharmacy.

2. Prepare the MP and carry out their herbarization.

3. Bring the harvested MP to a standard state according to the GMP.

4. Draw up a diary of production practice, providing, according to the above description, the characteristics of the MP containing a certain group of BAS.

5. Indicate in the diary the method of determining the yield of MPM.

6. Familiarize yourself with the regulatory materials (Orders of the Ministry of Health, monographs of the State Financial Institution, TUU, SSTU, etc.) on MPM.

11. Criteria and the procedure for assessing learning outcomes

Assessment of the acquisition of topics of the educational component during classes:

Types of work for which the applicant receives points	***Distribution of the maximum number of points per topic (lesson) by type of work***	***The maximum number of points by control content module***
Content module 1		
testing	25	50
oral answer	25	
Content module 3		
testing	25	50
oral answer	25	
	Total points for the content modules:	***100***

Assessment of individual work of a higher education applicant:

during content module 1 control: tickets for content module 1 include theoretical questions and test tasks from topics 1-4.

during content module 2 control: tickets for content module 1 include theoretical questions and test tasks from topics 5-6.

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 by a 100-point scale	ECTS rating scale	Assessment by a four-point scale	Assessment by an undifferentiated scale
90-100	A	Excellent	passed
82-89	B	Good	
74-81	C		
64-73	D	Satisfactory	
60-63	E		
35-59	FX	Unsatisfactory	failed
1-34	F		

12. Teaching methods

- *explanatory (informational and reproductive) method:* Lecture-based learning – lectures, video materials;

- *reproductive method:* traditional practical classes;

- *problem-based teaching*: Brainstorming - method of "brainstorming"; Case-based learning - method of cases;

- *partial search method:* Game-based learning – game methods of learning (business games);

- *research method:* Research-based learning – participation in research work, preparation of theses of reports at conferences, scientific articles

13. Forms of progress and semester supervision of academic achievements

Types and forms of control:

Current control:

Control of content modules: oral interview, writing test tasks.

Semester control:

Form of semester control: differential test

Conditions for admission to semester control: current rating of more than 60 points, presence of a minimum number of points for control of content modules 1 and 2, absence of unworked absences of laboratory classes, fulfillment of all requirements stipulated by the work program of the educational component.

14. Methodological support

1. Diary of production practice.
2. Defect of herbarium specimens of the Republic of Lithuania.
3. Defect of medicinal plant raw materials.

15. Recommended reading

Essential reading

Pharmacognosy: textbook for higher school students / V.S. Kyslychenko, L.V. Upyr, Ya.V. Dyakonova, V.Yu. Kuznetsova, I.G. Zinchenko, O.A. Kyslychenko; ed. byV.S. Kyslychenko. – Kharkiv : NUPh : GoldenPages, 2011. – 552 p.; il.

2. Pharmacognosy: textbook for students of higher / V.S. Kislychenko, L.V. Lenchyk, I.G. Gurieva et al.; ed. by V.S. Kyslychenko. – Kharkiv : NUPh : Golden Pages, 2019. – 584 p.

3. Medicinal plants resource science : handbook for students of higher schools / V.S. Kyslychenko, L.V. Upyr, I.G. Zinchenko, O.A. Kyslychenko, S.I. Stepanova; ed. by V.S. Kyslychenko. – Kharkiv : NUPh : Golden Pages, 2012. – 168 p.

Supplementary literature:

1. Text book of Pharmacognosy and Phytochemistry / A. Dhole, V. Dhole, V. Yeligar, Ch. Magdum. Pharma Career Publication, 2019. – 778 p.

2. Gokhale S. B., Kokate C. K., Purohit A. P. A textbook of Pharmacognosy. 29th Edition. 2017. 284 p.

3. Kumar N. A Textbook Of Pharmacognosy. A.I.T.B.S. Publishers, India. 2010. 502 p.

4. Shah B. N., Seth A.K. Textbook of Pharmacognosy and Phytochemistry. Elsevier. 2010. 587 p.

5. Singh A. A Textbook of Pharmacognosy. Pharma Book Syndicate. 2013. 836 p.

6. British Pharmacopoeia Commission, 2016. British Pharmacopoeia. London: TSO.

7. European Pharmacopoeia. 8th ed including supplements 1 (2014), 2 (2014), 3 (15), 4 (15), 5(2015). Council of Europe, Strasbourg, France. 2014.

8. Textbook of Pharmacognosy and Phytochemistry - E-Book / Shah B., Seth A. – Elsevier Health Sciences, 2012. – 620 p.

16. Information resources, including the Internet

1. Website of the Department of Pharmacognosy and Nutriciology – www.cnc.nuph.edu.ua
2. Website of the NUPh library – http://lib.nuph.edu.ua
3. Electronic archive of the NUPh – http://dspace.nuph.edu.ua
4. Center for Distance Technologies of the National Academy of Sciences of Ukraine – pharmel.Kharkiv.edu
5. NUPh. Online tests – http://tests.nuph.edu.ua
6. Vernadsky National Library of Ukraine – http://www.nbuv.gov.ua

7. V.G. Korolenko Kharkiv State Scientific Library – http://korolenko.kharkov.com

8. Міністерство охорони навколишнього природного середовища та ядерної безпеки України - http://regulation.gov.ua/catalogue/regulators/id191/npa/page-3

9. The National Center for Biotechnology Information advances science and health - http://www.ncbi.nlm.nih.gov/pubmed