SYLLABUS OF THE EDUCATIONAL COMPONENT
Pharmacognosy with the basics of resource science

for students of higher education, 3rd year of full-time education (4.10д)
educational program «Pharmacy»
specialty «226 Pharmacy, industrial pharmacy»
field of knowledge «22 Health care»
the second (master's) level of higher education

TEACHERS

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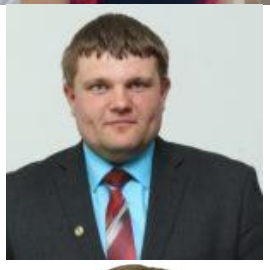

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1. Name of higher education institution and unit: National University of Pharmacy, Department of Chemistry of Natural Compounds and Nutriciology.

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4. Information about teachers:
Natalia POPOVA
Doctor of Pharmaceutical Sciences, Professor, Professor of the Department of Chemistry of Natural Compounds and Nutriciology of the National Pharmaceutical University. Experience of scientific and pedagogical activity – 39 years. Reads courses: «Pharmacognosy with the basics of resource science», «Resourse science of medicinal plants», «Nutritiology». Research interests: chemistry of natural compounds, plant cultivation.
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Candidate of Pharmaceutical Sciences, assistant of Prof. of Department of Chemistry of Natural Compounds and Nutriciology of the National Pharmaceutical University. Experience of scientific and pedagogical activity – 8 years. Reads courses: «Pharmacognosy with the basics of resource science», «Resourse science of medicinal plants», «Nutritiology». Research interests: chemistry of natural compounds, plant cultivation.
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Candidate of Pharmaceutical Sciences, assistant of Department of Chemistry of Natural Compounds and Nutriciology of the National Pharmaceutical University. Experience of scientific and pedagogical activity – 5 years. Reads courses: «Pharmacognosy with the basics of resource science», «Resourse science of medicinal plants», «Nutritiology». Research interests: chemistry of natural compounds, plant cultivation.
5. Consultations: *online, take place every Tuesday from 12.05 to 12.50*
6. Abstract of the educational component: *Pharmacognosy with the basics of resource science* is a highly specialized applied science that studies the biological, biochemical and medicinal properties of plants, natural raw materials and products from them; provides knowledge, skills and abilities in the identification of medicinal plants (MP), determination of stocks, procurement, storage and analysis of medicinal plant raw materials, as well as individual products of plant and animal origin. The educational component is based on the chemical classification of medicinal plants, introduces higher education students to the ways of biosynthesis of medicinal plants, the patterns of distribution of medicinal plants in nature, the peculiarities of the exploitation of medicinal plant thickets, the organization of their protection and reproduction in natural conditions. The sequence of teaching the course of pharmacognosy with the basics of resource science corresponds to the sequence of biochemical processes in the plant organism, takes into account the biogenetic features of different groups of BAC. First, MP and medicinal plant raw materials (MPM), which contain primary metabolites (carbohydrates, lipids, peptides and proteins), are considered, then - compounds of secondary biosynthesis, formed through mevalonic acid or the shikimate pathway, etc. When studying in a laboratory session, preference is given to classic objects of pharmacognosy and raw materials.
7. The purpose of teaching the educational component "Pharmacognosy with the basics of resource science" is training students of higher education to find and identify medicinal plants in nature by their morphological features, to know the periods and rational practices of collection, primary processing, drying conditions, packing, rules of MPM storage; to carry out commodity research, macroscopical, microscopical, phytochemical, luminescent and chromatographic analysis of MPM, products of its and raw material of animal origin processing, which is necessary in practical activity of a pharmacist.
8. Competencies according to the educational program:
Soft-skills / General competences (GC):
GC 6. Knowledge and understanding of the subject area and understanding of professional activity.
Hard-skills / Professional (special) competences (PC):
PC 16. The ability to organize and carry out the procurement of medicinal plant raw materials in accordance with the rules of the Good Practice of Cultivation and Collection of Raw Materials of Plant Origin (GACP), as a guarantee of the quality of medicinal plant raw materials and medicines based on them. The ability to predict and calculate ways to solve the problem of preservation and protection of thickets of wild medicinal plants, in accordance with current legislation.

PC 20. Ability to develop methods of quality control of medicinal products, including active pharmaceutical ingredients, medicinal plant raw materials and auxiliary substances using physical, chemical, physico-chemical, biological, microbiological, pharmacotechnological and pharmaco-organoleptic control methods.

9. Program learning outcomes (PLO):

PLO 7. Perform professional activities using creative methods and approaches.

PLO 28. Organize and carry out rational procurement of medicinal plant raw materials. Develop and implement measures for the protection, reproduction and rational use of wild species of medicinal plants.

10. Status of the educational component: *compulsory*

11. Prerequisites of the educational component: based on the knowledge obtained by students of higher education while studying the Latin language, botany, organic chemistry, biological chemistry, analytical chemistry, biophysics, physical and colloidal chemistry, normal and pathological human physiology;

12. The amount of the educational component:

(4,10д) – 270 hours 9 credits ECTS*:24 hours - lectures, 55 hours - laboratory lessons, 124 hours of independent work.*

13. Organization of training:

The form of teaching the educational component: conducting lectures, laboratory lessons.

The content of the educational component:

Module 1. ***Methods of pharmacognostic analysis of MPM. MP and raw materials of plant and animal origin, which contain carbohydrates, glycosides, lipids, proteins, vitamins, organic acids and isoprenoids.***

Content module 1. *General part of pharmacognosy. Medicinal plants and natural raw materials containing carbohydrates, thio- and cyanoglycosides, lipids, proteins, vitamins, organic acids.*

Topic 1. *General part of Pharmacognosy. Pharmacognostic methods.*
Topic 2. *Carbohydrates. Glycosides.*
Topic 3. *Lipids and lipoids.*
Topic 4. *Proteins.*
Topic 5. *Vitamins.*
Topic 6. *Macro- and microelements. Organic acids.*
Topic 7. *Glucosinolates (thioglycosides) and cyanogenic glycosides.*

Content module 2. *Medicinal plants and natural raw materials that contain isoprenoids (monoterpene glycosides, bitters, essential oils, triterpenoids, steroids, saponins and cardiac glycosides).*

Topic 8. *Terpenoids. Iridoids. Bitters.*
Topic 9. *Essential oils.*
Topic 10. *Diterpenoids. Resins and balsams.*
Topic 11. *Triterpenoids. Steroids. Saponins.*
Topic 12. *Cardiac glycosides.*

Module 2. ***MP and MPM, which contain phenolic compounds, alkaloids and various groups of BAC, medicinal raw materials of animal origin. Merchandising analysis of MPM. Medical fees and teas. Resource science of medicinal plants.***

Content module 3. *Medicinal plants and plant material containing phenolic compounds.*

Topic 13. *Phenolic compounds.*
Topic 14. *Lignans.*
Topic 15. *Coumarins and chromones.*
Topic 16. *Xanthones.*
Topic 17. *Flavonoids.*
Topic 18. *Quinones. Anthraquinones.*
Topic 19. Tannins.

Content module 4. *Medicinal plants and plant material containing alkaloids and different groups of BAC. Merchandising analysis of MPM. Medical fees and teas. Resource science of medicinal plants.*

Topic 20. *Alkaloids.*
Topic 21. *Medicinal plants and raw material containing different biologically active compounds. Tissue cultures.*
Topic 22. *Merchandising analysis of MPM.*
Topic 23. *Ways of processing medicinal plant raw materials. Analysis of medicinal fees and teas.*
Topic 24. *Resource science of medicinal plants.*

14. Types and forms of control:

Types and forms of control:

Current control of theoretical and practical knowledge in the form of an oral, written and test survey using standardized methods for diagnosing knowledge, abilities and skills is carried out at each laboratory session in accordance with the specific goals of the topic and during the individual work of the teacher for topics that are not included in the structure of the lesson and are developed by the student of higher education independently.

Control of content modules - control of theoretical knowledge in the form of an oral, written and test survey of applicants for higher education, as well as practical skills in determining the identity and benignity of MPM. Control refers to knowledge and skills, both acquired in classes, and objects and topics developed independently by students of higher education.

When *studying the educational component* «Pharmacognosy with the basics of resource science», students of higher education take a semester exam. The exam on pharmacognosy with the basics of resource science is conducted in written form during the exam session, according to the schedule.

Form of control - semester credit, semester exam.

Conditions for admission to control of substantial module: the presence of a minimum number of points for topics (lessons) of the substantial module, for control of substantial module 1 (for control of substantial module 2, 3, 4),

Conditions for admission to semester control: current rating of more than 60 points, availability of the minimum number of points for control of content modules 1, 2, 3 and 4, absence of unworked passes of practical and seminar classes, fulfillment of all requirements stipulated by the work program of the educational component.

15. Evaluation system for the educational component: The results of the semester control in the form of a semester credit are evaluated on a 100-point, undifferentiated scale ("passed", "failed") and on the ECTS scale.

Points from the educational component are calculated according to the following ratio:

Types of assessment	Maximum number of points (% of the number of points per module - for content modules)
Module 1.	
Content module 1: • assessment of topics (1-7) (work in classes 1-7): work in classes (oral survey, writing input controls, solving logical problems); • control of content module 1 (solving theoretical, practical and logical tasks)	50 (50 %)
Content module 2: • assessment of topics (8-12) (work in classes 8-12): work in classes (oral survey, writing input controls, solving logical problems); • control of content module 2 (solving theoretical, practical and logical tasks)	50 (50 %)
Semester control of the module 1	100
Module 2.	
Content module 3: • evaluation of topics (13-19) (work in classes 13-19): work in classes (oral survey, writing input controls, solving logical problems); • control of content module 3 (solving theoretical, practical and logical tasks)	50 (50 %)
Content module 4: • assessment of topics (20-24) (work in classes 20-24): work in classes (oral survey, writing input controls, solving logical problems); • control of content module 4 (solving theoretical, practical and logical problems)	50 (50 %)
Semester control of the module 2	100

The semester exam is evaluated on a 100-point scale, a differentiated scale ("excellent", "good", "satisfactory", "unsatisfactory") and on the ECTS scale.

The independent work of students of higher education is evaluated during the current control and during the control of the content module

16. Policies of the educational component:

Academic Integrity Policy. It is based on the principles of academic integrity stated in the PROVISIONS "On measures to prevent cases of academic plagiarism at the NUPh". Writing off during the assessment of the success of a higher education student during control activities in practical (seminar, laboratory) classes, control of content modules and the semester exam is prohibited (including with 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 enroll it.

Class attendance policy. A student of higher education is obliged to attend classes (PROVISIONS "On the organization of the educational process of the NUPh") 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 debt. The completion of missed classes by a student of higher education is carried out in accordance with the PROVISIONS "Regulations on the completion of missed classes by students and the procedure for eliminating academic differences in the curricula of the NUPh " in accordance with the schedule for making up missed classes established by the department. Increasing the rating and liquidating academic debt from the educational component is carried out by the students in accordance with the procedure specified in the PROVISIONS "On the procedure for evaluating the results of training of students of higher education at the NUPh ".

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 assessment from the educational component (appeals). Applicants of 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 PROVISIONS "Regulations on appealing the results of the semester control of the knowledge of students of higher education at the NUPh ".

17. Informational and educational and methodological support of the discipline:

Mandatory literature	1. 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. 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. 3. 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. 4. Gokhale S. B., Kokate C. K., Purohit A. P. A textbook of Pharmacognosy. 29th Edition. 2017. – 284 p. 5. Kumar N. A Textbook Of Pharmacognosy. A.I.T.B.S. Publishers, India. 2010. – 502 p.13. 6. Shah B. N., Seth A.K. Textbook of Pharmacognosy and Phytochemistry. Elsevier. 2010. – 587 p. 7. Singh A. A Textbook of Pharmacognosy. Pharma Book Syndicate. 2013. – 836 p. 8. Text book of Pharmacognosy and Phytochemistry / A. Dhole, V. Dhole, V. Yeligar, Ch. Magdum. Pharma Career Publication, 2019. – 778 p.
Additional literature for in-depth study of the educational component	1. British Pharmacopoeia Commission, 2016. *British Pharmacopoeia.* London: TSO. 2. European Pharmacopoeia. 8th ed including supplements 1 (2014), 2 (2014), 3 (15), 4 (15), 5(2015). Council of Europe, Strasbourg, France. 2014. 3. Textbook of Pharmacognosy and Phytochemistry - E-Book / Shah B., Seth A. – Elsevier Health Sciences, 2012. – 620 p.
Current electronic information resources (magazines, websites) for in-depth study of	1. Website of the Department of Chemistry of Natural Compounds – www.cnc.nuph.edu.ua 2. Website of the NUPh library – http://lib.nuph.edu.ua 3. Vernadsky National Library of Ukraine – http://www.nbuv.gov.ua 4. V. N. Karazin Kharkiv National University (Official Website) – http://www.univer.kharkov.ua

the educational component	5. Website of the KhNMU Scientific Library – http://libr.knmu.kharkov.ua 6. V.G. Korolenko Kharkiv State Scientific Library – http://korolenko.kharkov.com 7. The National Center for Biotechnology Information advances science and health - http://www.ncbi.nlm.nih.gov/pubmed.
Moodle distance learning system	https://pharmel.kharkiv.edu/moodle/course/view.php?id=3644

18. Technical and software of the educational component: computers for testing, multimedia device, screen.