

SYLLABUS OF THE EDUCATIONAL COMPONENT**Pharmacogenetics**

**for applicants for higher education of 4 year of study full-time form of education
(4 years 10 months)**

of educational program «Pharmacy»

(Educational Program Name)

in specialty «226 Pharmacy and industrial pharmacy»

field of knowledge «22 Health»

(Code and Knowledge Field Name)

training for Master

(Higher Educational Level Name)

TEACHERS

**Kononenko
Nadiia**

kononenkonn76@gmail.com

1. The name of higher education establishment and department: the National University of Pharmacy, Department of Physiology and Pathological Physiology.

2. Address of the department: Kharkiv, 12 Kylikovska str., 3rd floor, 057-706-30-66.

3. Web site of the department: <http://pat.nuph.edu.ua/>

4. Information about teachers:

Kononenko Nadiia

Doctor of Medical Sciences, Professor, head of the Department of Physiology and Pathological Physiology of the National Pharmaceutical University. Experience of scientific and pedagogical activity is 22 years. She teaches courses: "Pathological physiology", "Pharmacogenetics", "Pathophysiology of civilization diseases". Scientific interests: pathogenetic mechanisms of development of peptic ulcer, endocrine pathology; pharmacological studies of drugs.

5. Consultations: are held at the Department of Normal and Pathological Physiology according to the schedule, online video conferences in the program Zoom.

6. Brief summary of the educational component: the Pharmacogenetics educational component studies the place and role of genetic factors in shaping the human body's response to medicines: effectiveness, ineffectiveness, and the development of adverse drug reactions. The regularities revealed by pharmacogenetics allow a clinical pharmacist to individually select both the medicines and their doses for each patient, ensuring the most effective and safe pharmacotherapy. Pharmacogenetics is a related discipline at the intersection of clinical pharmacology and genetics.

7. The purpose statement of studying the educational component: the aim of teaching the educational component "Pharmacogenetics" is to develop knowledge about the relationship between human genetic characteristics and pharmacological response to drugs, toxicants, etc.

8. Competences in accordance with the educational program:

Soft- skills / General competences (CG):

CG. 2. Ability to apply knowledge in practical situations, make reasonable decisions.

CG. 4. Ability to abstract thinking, analysis and synthesis, to learn and be modernly trained.

CG. 6. Knowledge and understanding of the subject area and understanding of professional activity.

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

PC 2. Ability to provide medical advice on prescription and over-the-counter medications and other products of the pharmacy range; pharmaceutical care during the selection and sale of over-the-counter medications by assessing the risk / benefit, compatibility, indications and contraindications based on data

on the health of a particular patient, taking into account biopharmaceutical, pharmacokinetic, pharmacodynamic and physicochemical characteristics of the medicine and other pharmaceutical products. PC 4. Ability to ensure the rational use of prescription and over-the-counter medications and other pharmaceutical products in accordance with physicochemical, pharmacological characteristics, biochemical, pathophysiological features of a particular disease and pharmacotherapeutic regimens for its treatment.

PC 5. Ability to monitor the effectiveness and safety of the population of medications according to the data on their clinical and pharmaceutical characteristics, as well as taking into account subjective signs and objective clinical, laboratory and instrumental criteria for the examination of a patient.

9. The program learning outcomes: (PLO):

PLO 2. To apply knowledge of general and professional disciplines in professional activities.

PLO 12. To analyze the information obtained as a result of scientific research, summarize, systematize and use it in professional activities.

PLO 14. To determine the advantages and disadvantages of medications of different pharmacological groups, taking into account their chemical, physicochemical, biopharmaceutical, pharmacokinetic and pharmacodynamic features. To recommend to consumers over-the-counter medications and other products of the pharmaceutical range with the provision of counseling and pharmaceutical care/

PLO 16. To determine the influence of factors influencing the processes of absorption, distribution, deposition, metabolism and excretion of the drug and due to the condition, features of the human body and physico-chemical properties of medications/

PLO 17. To use clinical, laboratory and instrumental research data to monitor the efficacy and safety of medicines.

PLO 25. To promote health, including disease prevention, rational use and use of medicines. To perform your professional duties in good faith, comply with the law on the promotion and advertising of medicines. To have psychological communication skills to build trust and understanding with colleagues, doctors, patients, consumers.

10. Status of the educational component: *selective*

11. Prerequisites of the educational component: is based on Biology with the Basics of Genetics, Pathological Physiology, Pharmacology, Pharmacotherapy with Pharmacokinetics.

12. The volume of the educational component: 3 ECTS credits 90 hours: lectures - 8 hours, practical classes - 24 hours, independent work - 58 hours.

13. Organization of training:

The format of teaching the educational component

Content of the educational component:

Content module 1. *General pharmacogenetics. Systems of biotransformation of drugs*

Topic 1: Basic principles of pharmacogenetics.

Topic 2. The system of biotransformation of drugs. Factors that affect the metabolism of drugs.

Topic 3. Reactions of the first phase of drug biotransformation.

Topic 4. Reactions of the second phase of drug biotransformation.

Content module 2. *Problems of personalized medicine*

Topic 5. Clinical pharmacogenetics of drugs for the treatment of cardiovascular diseases.

Topic 6. Clinical pharmacogenetics of drugs used in rheumatology.

Topic 7. Pharmacogenetics of neuroreceptors.

Topic 8. Genetic basis of alcoholism and drug addiction.

Semester control of the module

14. Types and forms of control::

Types and forms of control::

Control of knowledge at each lesson: oral questioning, test tasks, solving situational tasks (medical situations).

Supervision of content modules: oral questioning, test tasks.

Semester control form: semester credit.

Conditions for admission to the supervision of content modules: For example, for admission to the

supervision of content module 2, it is necessary to have a minimum number of points for the topics (classes) of content module 1, for the supervision of content module 1

Conditions for admission to semester supervision: For example, a current rating of more than 60 points, absence of missed laboratory, practical and seminar classes, fulfillment of all requirements stipulated in the work program of the educational component.

15. Evaluation system of the educational component:

Evaluation system of the educational component:

The results of the semester control in the form of a semester test are evaluated on a 100-point, undifferentiated scale ("passed", "failed") and on the ECTS scale.

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

Types of evaluation	Maximum number of points (% of the number of points per module - for content modules)
Content module 1 <i>1. Assessment of topics 1-6: in-class work (oral questioning, test tasks, practical assignments or case studies). 2. Control of the content module 1: theoretical questions and test tasks.</i>	50 (50 %)
Content module 2 <i>1. Assessment of topics 7-13: in-class work (oral questioning, test tasks, practical assignments or case studies). 2. Control of Content Module 2: theoretical questions and test tasks.</i>	50 (50 %)
Semester Supervision of Module 1	100

The individual work of applicants for higher education is evaluated during the control of knowledge at each lesson and during the content module supervision

16. Academic policies of the educational component:

For example, 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".

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

The main reading suggestions	<ol style="list-style-type: none"> 1. Pharmacogenetics. Towards improving treatment with medicines. Geneva, 2005. 224 p. 2. Pathological physiology. Module 1: teaching aid for teachers for practical training with applicants for higher education specialty «226 Pharmacy, industrial pharmacy» of the educational and professional program «Pharmacy» / N. M. Kononenko, V. V. Gnatyuk, V. A. Rybak [et al.]. Kharkiv: NUPh, 2021. 260 p. 3. Pathological physiology. Module 1: teaching aid for practical training for applicants for higher education in the specialty «226 Pharmacy, industrial pharmacy» of the educational and professional program «Pharmacy» / N. M. Kononenko, V. V. Gnatyuk, V. A. Rybak [et al.]. Kh.: NUPh, 2021. 245 p. 4. Pathological Physiology: Manual for students of higher schools / S. I. Kryzhna, N. M. Kononenko, T. I. Tyupka [et al.]. Kharkiv: NUPh: Golden Pages, 2012. 200 p.
Supplementary reading suggestions for in-depth study of the educational component	<ol style="list-style-type: none"> 1. Pathophysiology: textbook / N.V. Krishtal, V.A. Mikhnev, N.N. Zayko et al.; edited by N.V. Krishtal, V.A. Mikhnev. 2nd edition, corrected. Kyiv: AUS Medicine Publishing, 2018. 656 p. 2. General and clinical pathophysiology: textbook for students of higher educational institutions, of IV th level of accreditation /A. V. Kubyshkin [et al.]; ed. by.: A. V. Kubyshkin, A. I. Gozhenko; пер.: N. V. Krishtal, N. K. Kazimirko. 2nd ed. Vinnytsya: Nova Knyha Publishers, 2016. 656 p. 3. Simeonova N. K. Pathophysiology=Патофізіологія: textbook for students of higher medical educational institutions of the III-IV accreditation levels / N. K. Simeonova; ed. by V. A. Mikhnev. 3rd ed. Kyiv: AUS Medicine Publishing, 2017. 544 p. 4. Means of Protecting the Body from the Effects of Ionizing Radiation: study guide / T.O. Zhukova, V.F. Pocherniayeva, V.P. Bashtan. K.: BCB «Медицина», 2019. 112 c. 5. Kathryn L. McCance, Sue E. Huether Study Guide for Pathophysiology - E-Book: The Biological Basis for Disease in Adults and Children. Elsevier Health Sciences, 2018. 325 p. 6. Lee-Ellen C. Copstead-Kirkhorn, Jacquelyn L. Banasik Study Guide for Pathophysiology - E-Book. Elsevier Health Sciences, 2013. 304 p. 7. Tommie L. Norris. Porth's Essentials of Pathophysiology. 5th edition, 2019. 1248 p. 8. Gary D. Hammer, Stephen J. McPhee. Pathophysiology of Disease: An Introduction to Clinical Medicine. 8th edition, 2018. 832 p.
Current electronic information resources (magazines, websites) for in-depth study of the educational component	<ol style="list-style-type: none"> 1. Website of the Department of Physiology and Pathological Physiology: https://pat.nuph.edu.ua/ 2. Library of NUPh: e-mail https://lib.nuph.edu.ua/ 3. Distance learning website: https://pharmel.kharkiv.edu/ 4. Pharmacogenomics and Personalized Medicine https://www.mdpi.com/books/book/2700-pharmacogenomics-and-personalized-medicine 5. Principles of Pharmacogenetics and Pharmacogenomics https://assets.cambridge.org/97805218/85379/frontmatter/9780521885379_frontmatter.pdf

	6. Pharmacogenetics and Pharmacogenomics https://biol.lf1.cuni.cz/ucebnice/pdf/Pharmacogenetics_and_Pharmacogenomics.pdf 7. Introduction to Pharmacogenomics https://www.encepp.eu/publications/documents/6.1_Pharmacogenomics.pdf
Moodle distance learning system	https://pharmel.kharkiv.edu/moodle/course/view.php?id=49#section-0

- 18. Material and technical support and software of the educational component:** laptop, TV, personal computers with MS Windows 10 Professional Academic OLP software, MS Office standard 2019 Academic OLP for testing, multimedia device, screen, tissue culture laboratory equipment.