**SYLLABUS OF THE EDUCATIONAL COMPONENT**

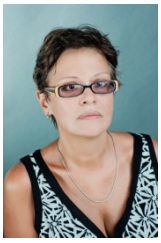
# PHARMACOLOGY

(the name of the educational component)

**for applicants for higher education of 3 year of study full form of education (4.10 year of study)**
**of educational program «Pharmacy»**
(Educational Program Name)
**in specialty «**226 Pharmacy, industrial Pharmacy**»**
(Code and Specialty Name)
**field of knowledge «**22 Publik Health**»**
(Code and Knowledge Field Name)

**training for** second master_level
(Higher Educational Level Name)

**TEACHER**



**SHCHOKINA Kateryna** acya@ukr.net

1. **The name of higher education establishment and department: the National University of Pharmacy, Pharmacology and Pharmacotherapy Department.**
2. **Address of the department:** Kharkiv, str. Kulikovskaya, 12, 2nd floor, Ph. 057-706-30-69.
3. **Web site of the department:** http://pharmacol.nuph.edu.ua
4. **Information about teachers:**

***Shchokina Catherine***

Doctor of Pharmacy, Professor, Department of Pharmacology and Pharmacotherapy, National University of Pharmacy. Experience of scientific-pedagogical activity - 20 years. Reads courses: «Фармакология», «Pharmacology», "Clinical pharmacy with pharmaceutical care". Research interests: NSAIDs, prostatoprotectors, immunocorrectors.

5. **Consultations:** take place by agreement with the teacher.
6. **Brief summary of the educational component:** Pharmacology provides higher education students with the necessary knowledge about routes of administration, types of action, dosage of drugs, mechanisms of action, pharmacodynamics, pharmacokinetics, indications for use, side effects and contraindications, interchangeability of drugs of each pharmacological group, stages of creation of medical means, as well as identifying the main directions of scientific ideas and trends in the development of the discipline.
7. **The purpose statement of studying the educational component:** to form and deepen students' professional and competent knowledge of the pharmacological properties and conditions of rational use of modern medicines
8. **Competences in accordance with the educational program:**

**Soft- skills / General competences (CG):**

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

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

CP 1. The ability to act socially responsibly and civically.
CP 2. Ability to apply knowledge in practical situations, make informed decisions.
CP 4. Ability to think abstractly, analyze and synthesize, learn and be modernly educated.

CP 5. Ability to show initiative and entrepreneurship.

**9. The program learning outcomes: (PLO):** PLO 5. To position one's professional activity and personal qualities on the pharmaceutical labor market; formulate the goals of one's own activity taking into account public and industrial interests.

PLO 6. To position one's professional activity and personal qualities on the pharmaceutical labor market; formulate the goals of one's own activity taking into account public and industrial interests.

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

PLO 8. Carry out professional communication in the state language, use oral communication skills in a foreign language, analyze specialized texts and translate foreign language information sources.

PLO 13. To carry out sanitary and educational work in professional activities in the event of outbreaks of infectious, viral and parasitic diseases.

PLO 14. Determine the advantages and disadvantages of drugs of various pharmacological groups, taking into account their chemical, physicochemical, biopharmaceutical, pharmacokinetic and pharmacodynamic characteristics. Recommend to consumers non-prescription drugs and other products of the pharmacy assortment with the provision of advisory assistance and pharmaceutical care.

PLO 16. Determine the influence of factors that affect the processes of absorption, distribution, deposition, metabolism and excretion of the medicinal product and are determined by the condition, features of the human body and the physico-chemical properties of medicinal products.

PLO 25. To contribute to the preservation of health, in particular the prevention of diseases, the rational prescription and use of medicinal products. To conscientiously fulfill one's professional duties, to comply with the legislation on the promotion and advertising of medicinal products. Possess psychological communication skills to achieve trust and mutual understanding with colleagues, doctors, patients, consumers.

**10. Status of the educational component:** *compulsory*

**11. Prerequisites of the educational component:** a based on knowledge of biology, anatomy and normal physiology, pathology, organic chemistry, Latin, biochemistry, microbiology, pharmacognosy; provides a high level of biomedical training; lays the foundation study of clinical pharmacology, pharmacotherapy, pharmaceutical chemistry, toxicological chemistry, pharmaceutical care, pharmacoeconomics, involves the integration of teaching with these disciplines; creates the ability to apply this knowledge in the further education and professional activities; laying the foundations professionally oriented thinking, healthy lifestyles and prevention of functions in the human life.

**12. The volume of the educational component:** 10,0 cedits EKTC: 300 hours per educational component: 146 – general, 32 – lectures, 114 – practical (seminar, laboratory) classes, 154 – individual work.

**13. Organization of training:**

| **Lectures** |
|---|
| General pharmacology. Kinds of action and routes of administration of drugs. The mechanisms of action, kinds of action of drugs. Side effects of drugs |
| General pharmacology. Pharmacokinetics. Classification and principles of the drug dosing. The phenomena that occur during the repeated and combined administration of drugs |
| Drugs affecting the afferent innervation |
| Medicines affecting efferent innervation: pharmacological description of cholinergic agonists |
| Medicines affecting efferent innervation: pharmacological description of cholinergic antagonists |
| Medicines affecting efferent innervation: pharmacological description of adrenergic agonists |
| Medicines affecting efferent innervation: pharmacological description of adrenergic antagonists |
| Pharmacological correctors of allergy |
| Pharmacological correctors of inflammation |
| Pharmacological correctors of pain |
| Psychotropic drugs with inhibitory action |
| Neurotropic drugs with inhibitory action |
| Pharmacological description of CNS stimulants (1 part). |
| Pharmacological description of CNS stimulants (2 part). |
| Medicines affecting GIT (1 part) |
| Medicines affecting GIT (2 part) |
| Cardiotonic and anti-arrhythmic agents |
| Anti-anginal drugs |
| Pharmacology of antihypertensive drugs (1 part) |
| Pharmacology of antihypertensive drugs (2 part) |
| Modern dugs that affect the function of the urinary-genital system. Antigouts |
| Drugs that affect blood coagulative system |
| Drugs that affect blood formation |
| Modern drugs with activity of hormones of the hypothalamus, pituitary, epiphysis, thyroid, parathyroid gland |
| Insulins. Synthetic hypoglycemic drugs |
| Drugs with activity of adrenal gland hormones |
| Drugs with activity of gonads. Anabolic steroids. Contraceptives |
| Pharmacological characteristic of synthetic antibacterial drugs. Sulfonamides. Fluoroquinolones. Antituberculous medicines |
| Modern antibiotics: beta-lactams, macrolides, tetracyclines |
| Antibiotics of different groups: aminoglycosides, glycopeptides, lincosamides, polymyxins, chloramphenicols, rifamycins etc |
| Antiviral drugs |
| Antifungal and antihelminthic drugs |
| **Practical lessons** |
| Rules of prescribing of solid and soft medicinal forms |
| Rules of prescribing of liquid medicinal forms |
| General pharmacology. Kinds of action and routes of administration of drugs. The mechanisms of action, pharmacodynamics of drugs. Side effects of drugs. |
| General pharmacokinetics of drugs. The nature and essence of the interaction between the medicine and components of cell membranes. Factors affecting the pharmacodynamics and pharmacokinetics of drugs |
| **Control of content module 1.** |

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|---|
| Drugs affecting the afferent innervation |
| Medicines affecting efferent innervation: pharmacological description of cholinergic agonists |
| Medicines affecting efferent innervation: pharmacological description of cholinergic antagonists |
| Medicines affecting efferent innervation: pharmacological description of adrenergic agonists and antagonists |
| Pain correctors. Pharmacological description of narcotic (opioid) analgesics and non-narcotic analgesics (analgesics-antipyretics). Spasmoanalgesics. NSAID |
| Pharmacological description of anti-allergic agents: blockers of $H_1$-histamine receptors, membrane stabilizers, blockers of serotonin receptors, selective antagonists of leukotriene receptors |
| **Control of content module 2** |
| Psychotropic drugs of depressant effect. Antipsychotic drugs. Anxiolytics. Sedatives. Hypnotics. |
| Neurotropic drugs of depressant effect. Anticonvulsants. Antiepileptic drugs. Antiparkinsonian drugs |
| Pharmacological description of CNS stimulants |
| Drugs that affect the function of the gastrointestinal tract. Antacids, $H_2$-blockers of receptors of histamine, proton pump inhibitors, $M_1$-cholinoreceptors blockers, gastroprotectors. Regulators of appetite, emetic, antiemetic drugs |
| Drugs that affect the function of the gastrointestinal tract. Hepatoprotectors, choleretic and cholelytics, laxative drugs. Enzyme and anti-enzymatic drugs |
| **Control of content module 3** |
| Drugs that affect the functions of the respiratory system. Decongestants, anti-tussive drugs, broncholytics, expectorants, mucolytics, surfactants, bronchodilators |
| Cardiac glycosides and nonglycosides cardiotonics, antiarrhythmic drugs |
| Anti-anginal drugs: nitrovasodilators, blockers of calcium channels, β-adrenoblockers, cardioprotectors, antiatherosclerotic drugs |
| Antihypertensive drugs: selective agonists of imidazoline receptors, α-adrenoblockers, β-adrenoblockers, sympatholytics, ganglionic blockers, blockers of calcium channels, inhibitors of ACE, antagonists of angiotensin II receptors, peripheral vasodilators and other drugs |
| Diuretics. Antigouty drugs |
| **Control of content module 4** |
| Vitamins and vitamin-like drugs |
| Drugs that affect blood coagulative system. Direct-acting and indirect-acting anticoagulants. Antiaggregants. Activators and inhibitors of fibrinolysis. Hemostatics. |
| Regulators of erythropoiesis. Pharmacology of iron containig drugs |
| Drugs with the activity of hormones of the hypothalamus, pituitary, pineal, thyroid, parathyroid glands. Insulins. Synthetic hypoglycemic drugs |
| Hormonal drugs of adrenal gland cortex and gonads. Contraceptives |
| **Control of content module 5** |
| Sulfonamides. Fluoroquinolones. Antituberculous medicines |
| Antibiotics: penicillins, cephalosporins, carbapenems, monobactams, macrolides, tetracyclines |
| Antibiotics of different groups: glycopeptides, aminoglycoside, lincosamides, phosphomycines, fusidines, polymyxines, chloram-phenicols, rifamycines |
| Antifungal, antihelminthic, antiviral drugs |
| **Control of content module 6** |

**The format of teaching the educational component**
**Content of the educational component:**

## Module 1. General pharmacology. Medicines affecting peripheral nervous system and neurotransmitter processes

### Content module 1. General pharmacology. General prescription

**Topic 1.** *Introduction to prescription writing. Prescription writing of solid and soft medicinal*

*forms*

**Topic 2.** *Rules of liquid medicinal forms prescription writing*

**Topic 3.** *General pharmacology. Kinds of action and routes of administration of drugs. The mechanisms of action, pharmacodynamics and pharmacokinetics of drugs*

**Topic 4.** *General pharmacology. Classification and principles of the drug dosing. The phenomena that occur during the repeated and combined administration of drugs. Side effects of drugs*

**Content module 2. Medicines affecting peripheral nervous system and neurotransmitter processes.Pharmacological correctors of pain and inflammation**

**Topic 5.** *Drugs affecting the afferent innervation*

**Topic 6.** *Medicines affecting efferent innervation: pharmacological description of cholinergic agonists and antagonists*

**Topic 7.** *Medicines affecting efferent innervation: pharmacological description of adrenergic agonists and antagonists*

**Topic 8.** *Pharmacological correctors of allergy*

**Topic 9.** *Pharmacological correctors of pain. Medicines for general anesthesia. Alcohols*

**Topic 10.** *Nonsteroidal anti-inflammatory drugs*

**Content module 3. Drugs that affect the function of the central nervous system and gastro-intestinal tract**

**Topic 11.** *Psychotropic drugs with inhibitory action. Antipsychotics. Tranquilizers. Sedatives.*

**Topic 12.** *Neurotropic drugs with inhibitory action. Hipnotics. Anticonvulsants. Antiparkinsonian drugs*

**Topic 13.** *Psychotropic and neurotropic drugs with excitatory action. Psychostimulants. Antidepressants.*

**Topic 14.** *Psychotropic and neurotropic drugs with excitatory action. Nootropics. Analeptics. Actoprotectors. Adaptogens*

**Topic 15.** *Drugs that affect the function of the gastrointestinal tract: appetite correctors, emetic, anti-emetic, anti-ulcer, gastroprotectors, hepatoprotectors, spasmolytic, choleretic (choleretics, cholekinetiks) and cholelytics, laxative drugs*

**Module 2. Drugs that affect the functions of the executive organs, metabolism, blood and immune system. Chemotherapeutic drugs**

**Submodule 4. Drugs that affect the functions of the executive organs**

**Topic 16.** *Drugs that affect the functions of the respiratory system. Decongestants, anti-tussive drugs, broncholytics, expectorants, mucolytics, surfactants*

**Topic 17.** *Cardiotonic agents: glycoside and nonglycoside cardiotonics. Anti-arrhythmic agents*

**Topic 18.** *Anti-anginal drugs*: *nitrovasodilatators, calcium channel blockers*, β-*adrenoblockers*, coronarolytics, *cardioprotectors*

**Topic 19.** The *pharmacological characteristics of cerebral blood flow disorders correctors*. *Anti-atherosclerotic medicines*

**Topic 20.** *Antihypertensive drugs: agonists of imidazoline receptors, α- і β-adrenoblockers, ganglionic blockers, sympatholytics, slow calcium channel blockers, ACE inhibitors, angiotensin II receptor antagonists, peripheral vasodilatators etc*

**Topic 21.** *Drugs that affect the function of the urinary-genital system. Diuretics. Antigouts.*

**Submodule 5. Drugs that affect the functions of the metabolism, blood and immune system**

**Topic 22.** *Correctors of cellular and tissue metabolism: vitamin and vitamin-like medicines; enzyme and anti-enzyme medicines; antihypoxants and antioxidants*

**Topic 23.** *Drugs that affect blood coagulative system*

**Topic 24.** *Drugs that affect blood formation. Pharmacology of iron medicines. Correctors of leucopoiesis*

**Topic 25.** *Drugs with activity of hormones of the hypothalamus, pituitary, epiphysis, thyroid, parathyroid gland. Insulins. Synthetic hypoglycemic drugs*

**Topic 26.** *Drugs with activity of adrenal gland hormones and gonads. Anabolic steroids*

**Submodule 6. Chemotherapeutic drugs**

**Topic 27.** *Antiblastomic drugs. The principles of treatment of poisoning by drugs and substances. Antidotes. Radioprotectors*

**Topic 28.** *Synthetic antibacterial drugs. Sulfonamides. Fluoroquinolones. Antituberculous medicines*

**Topic 29.** *Antibiotics: penicillins, cephalosporins, monobactams, carbapenems, macrolides, tetracyclines*

**Topic 30.** *Antibiotics of different groups: aminoglycosides, glycopeptides, lincosamides, polymyxins, chloramphenicols, rifamycins etc*

**Topic 31.** *Antiviral, antifungal and antihelminthic drugs*

**Topic 32.** *Antiprotozoal and antispirochetal drugs. Antiseptics and disinfectants*

**14. Forms and types of academic achievements supervision:**

***Forms and types of academic achievements supervision***

*Progress supervision:* the types of control are listed (oral survey, writing test tasks, solving situational (calculation) problems, etc.)

*Supervision of content modules:* the types of tests are listed (oral survey, preparation of test tasks, solution of situational (calculation) problems, etc.)

*Semester exam:* types of tests are listed (answers to theoretical questions, writing test tasks, solving situational (calculation) problems, etc.)

*Semester control form:* semester credit/semester differentiated credit, semester exam (if available)

*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:**

Current control: oral survey, checking homework, writing test tasks, solving situational (calculation) problems.

Control of content modules: written work, oral survey, preparation of test tasks.

Semester exam: answers to theoretical questions, preparation of test tasks.

Form of semester control: semester credit/semester differentiated credit, semester exam.

Conditions for admission to the control of content modules: for admission to the control of content module 2, it is necessary to have a minimum number of points for the topics (lessons) of content module 1, for the control of content module 1.

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

***Evaluation system of 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.

The results of semester control in the form of a semester exam are evaluated on the ECTS scale, a 100-point scale and a four-point scale ("excellent", "good", "satisfactory", "unsatisfactory").

*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) |
|---|---|
| Module 1 | |
| Content module 1: General pharmacology. General prescription<br>*- evaluation of topics (1-4) (work in classes 1-48): work in classes (oral survey, writing test tasks, solving situational (calculation) problems);*<br>*- supervision of content module 1 (writing test tasks, solving situational (calculation) tasks)* | *For example, 30 (30 %)* |
| Content module 2: Medicines affecting peripheral nervous system and neurotransmitter processes. Pharmacological correctors of pain and inflame-mation<br>*- evaluation of topics (5-10) (work in classes 5-10): work in classes (oral survey, writing test tasks, solving situational (calculation) problems);*<br>*- supervision of content module 2 (writing test tasks, solving situational tasks)* | *For example, 35 (35 %)* |
| Content module 3: Drugs that affect the function of the central nervous system and gastro-intesti-nal tract<br>*- evaluation of topics (11-15) (work in classes 11-15): work in classes (oral survey, writing test tasks, solving situational (calculation) problems);*<br>*- supervision of content module 3 (writing test tasks, solving situational tasks)* | *For example, 35 (35 %)* |
| Semester Supervision of Module 1 | 100 |
| Module 2 | |
| Content module 4: Drugs that affect the functions of the executive organs<br>*- evaluation of topics (16-20) (work in classes 16-20): work in classes (oral survey, writing test tasks, solving situational (calculation) problems);*<br>*- supervision of content module 4 (writing test tasks, solving situational tasks)* | *35 (35 %)* |
| Content module 5: Drugs that affect the functions of the metabolism, blood and immune system<br>*- evaluation of topics (21-25) (work in classes 21-25): work in classes (oral survey, writing test tasks, solving situational (calculation) problems);*<br>*- supervision of content module 5 (writing test tasks, solving situational tasks)* | *35 (35 %)* |
| Content module 6: Chemotherapeutic drugs<br>*- evaluation of topics (26-32) (work in classes 26-32): work in classes (oral survey, writing test tasks, solving situational (calculation) problems);*<br>*- supervision of content module 6 (writing test tasks, solving situational tasks)* | *30 (30 %)* |
| Semester Supervision of Module 2 | 100 |

**The individual work of applicants for higher education is evaluated during the progress supervision and during the content module supervision**

**16. Academic policies of the educational component:**
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 discipline:**

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|---|---|
| **The main reading suggestions** | 1. Pharmacology-Cito! Textbook / Edited dy S.M. Drogovoz. – Kharkiv: 2012. – 192 p.<br>2. Pharmacology at your palms: reference book / Drogovoz S.M., Kutsenko T.A. – Kharkiv: NphaU, 2010. – 80 p.<br>3. Pharmacology : summary of lectures on spesial pharmacology (part I) / S.M. Drogovoz, T.A. Kutsenko. – Kharkiv: NPhaU, 2009. – 72 p.<br>4. Pharmacology : summary of lectures on spesial pharmacology (part II) / S.M. Drogovoz, T.A. Kutsenko, A.Yu. Pozdnyakova et al. – Kharkiv: NUPh: Golden Pages, 2012. – 80 p.<br>5. Pharmacology : manual for practice on spesial pharmacology (part I) / S.M. Drogovoz, T.A. Kutsenko. – Kharkiv: NPhaU, 2012. – 68 p.<br>6. Pharmacology : manual for practice on spesial pharmacology (part II) / S.M. Drogovoz, T.A. Kutsenko, A.Yu. Pozdnyakova et al. – Kharkiv: NUPh: Golden Pages, 2012. – 96 p.<br>7. General prescription: manual for foreign students of pharmaceutical and medical specialities, teachers, doctors and pharmacists (based on the credit-module system). – Kharkiv: NPhaU, 2012. – 60 p. |
| **Supplementary reading suggestions for in-depth** | 1. Toxicology : Summary of lectures, practice and tests on toxicology / S.M. Drogovoz, T.A. Kutsenko, A.Yu. |

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|---|---|
| **study of the educational component** | Pozdnyakova, V.A. Ulanova. – Kharkiv: NUPh: Golden Pages, 2011. – 88 p.<br>2. Pharmacology : a textbook / Viktor M. Bobyrov, Tetyana O. Devyatkina, Olena M. Vazhnicha, Vadim M. Khristyuk. – Vinnytsya: NOVA KNYHA Publishers, 2010. – 520 p.<br>3. Chekman I.S., Gorchacova N.O., Panasenko N.I., Bech P.O. Pharmacology. - Vinnytsya: NOVA KNYHA Publishers, 2006. – 384 p.<br>4. Firdaus M. Review of Pharmacology, 7th edition. – Karachi : Riaz Medical Publishers, 2007. – 190 p.<br>5. Ganziy T.V. Study Guide to Basic Pharmacology. – Kharkiv, Fakt, 2005. – 264 p.<br>6. Katzung B.G. Basic and Clinical Pharmacology, 9th edition. – New-York: Lange, 2004. – 1202 p.<br>7. Lippicott`s. Illustrated Reviews: Pharmacology, 4th Edition / Ed.: R. Finkel, M.A. Clark, L.X. Cubeddu. – Lippicott Williams Wilkins, 2008. – 560 p.<br>8. Rang H.P., Dale M.M., Ritter J.M., Moore P.K. Rang`s and Dale`s Pharmacology, 6th edition. – London: Churchill-Livingstone Elsevier, 2007. – 830 p.<br>9. Ukranian edition of Dorland`s Illustrated Medical Dictionary, 32 the edition. In 2 volums-Lviv: Nautilus, 2011. – 2176 p. |
| **Current electronic information resources (magazines, websites) for in-depth study of the educational component** | 1. Internet resources:<br>- State service of Ukraine for medicinal products // http://dls.gov.ua<br>- Journal of pharmacology and pharmacotherapy // www.jpharmacol.com<br>- Journal ScienceRise: Pharmaceutical Science //http://journals.uran.ua/sr_pharm/about<br>- Journal of medical affairs // https://liksprava.com/index.php/journal<br>2. Open access databases *(https://lib.nuph.edu.ua/news-category/bazi-danikh/).*<br>3. Databases Scopus (Elsevier); Web of Science (Clarivate analytics); ScienceDirect; Hinari, AGORA, ARDI, GOALI, OARE на платформі Research; Life;<br>4. Library of NPHU // http://nuph.edu.ua/ru/nauchnaya-biblioteka; E-mail: library@nuph.edu.ua<br>5. Website of the Department of Pharmacology and Pharmacotherapy NPHU // http:// pharmacolpharmacother.nuph.edu.ua; E-mail: pharmacolpharmacother@nuph.edu.ua |
| **Moodle distance learning system** | *https://pharmel.kharkiv.edu/moodle/course/view.php?id=2700* |

**18. Technical support and software of the educational component:**

1. Educational work program of the discipline.
2. Work program of the academic discipline.
3. Calendar and thematic plans of lectures, practical and seminar classes.

4. Criteria for evaluating the knowledge and skills of higher education applicants in the academic discipline.
5. List of theoretical questions and tasks for the current and final modular control of the discipline
6. List of test tasks in the discipline
7. A package of tickets for monitoring the assimilation of content modules (tickets, standards of answers, evaluation criteria)
8. Package of examination tickets (evaluation criteria)
9. Multimedia presentations of lectures according to the thematic plan.
10. Methodical recommendations for practical and seminar classes.
11. Methodical recommendations for students' independent work.
12. Textbooks
13. Educational and methodological workshops, manuals, atlases, recommendations
14. Workbooks
15. Video educational materials (educational films, recordings of experiments).