



MINISTRY OF HEALTH OF UKRAINE
NATIONAL UNIVERSITY OF PHARMACY
Department pharmacology and pharmacotherapy

SIDE EFFECTS OF DRUGS

(the name of educational component)

**WORK PROGRAM
of educational component**

training for second master level

(Higher Educational Level Name)

specialty 226 Pharmacy, industrial Pharmacy

(Code and Specialty Name)

field of knowledge « 22 Public Health »

(Code and Knowledge Field Name)

of educational program Pharmacy

(Educational Program Name)

in specialization(s) 226.01 Pharmacy

(name of specialization, if available)

Kharkiv-2023

(year of creation)

The work program of the educational component Side effects of drugs in specialty 226 Pharmacy, industrial Pharmacy educational program Pharmacy in specialization(s) 226.01 Pharmacy for applicants for higher education 4 year of study.

EDUCATIONAL COURSE TEAM:


SHCHOKINA Kateryna – professor of the institution of higher education, department of pharmacology and pharmacotherapy, doctor of Pharmacy, professor

SHTRYGOL' Sergiy – the head of the department of pharmacology and pharmacotherapy, doctor of Medicine, professor

Work program has been considered and approved at the Department meeting pharmacology and pharmacotherapy

Record from «28» August 2023 № 1

Head of the Department



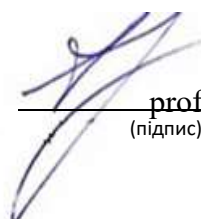
(sig.)

prof. Sergiy SHTRYGOL'
(first name LAST NAME)

Work program has been approved at the meeting of the Methodical Commission of biomedical sciences

Record from «12» September 2022 № 1

Head of Specialized Committee



prof. Nadia KONONENKO
(first name LAST NAME)

1. Description of the educational component

Language of study: English

Status of the educational component: selective

Prerequisites for studying 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, pharmacoconomics, 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.

The subject of educational component study « Side effects of drugs» is the side effects of the different pharmacological groups and its preparations in the problems of safe drug use.

Information content of the educational component. 3 ECTS credit 90 hours are assigned to the study of the educational component.

2. Objectives and tasks of the educational component

The purpose of teaching the educational component «Side effects of drugs» is to form and deepen the applicants` for higher education professional and competent knowledge of the side effects and contraindication of the modern drugs, to acquaint a pharmacists with the methodology of the choosing the most effective and safe medicines avoiding undesirable drug reactions.

The main tasks of the educational component «Side effects of drugs» is a formation in the applicants for higher education of a complete system of the theoretical knowledge on the basics of the side effects of drugs; an assimilation of the main principles of the pharmacological safety of the drugs; a familiarization with the basic principles of the formular system: the formulating regulations, Pharmstandard, the national treatment recommendations, the rational combinations of drugs; a familiarization with the general taking medications; increase the level of general and the scientific development of students, the formation of their outlook and horizons as a modern qualified pharmacists.

3. Competence and planned educational outcomes

Educational component «Side effects of drugs» ensures the acquisition of applicants for higher education the following **competences**:

Integral - the ability to solve typical and complex specialized tasks and practical problems in professional pharmaceutical activities in the field of health care on a socially oriented basis or in the learning process, which involves conducting chemical, biopharmaceutical, biomedical, sociological, etc. research and/or implementation of innovations and is characterized by uncertainty of conditions and requirements; integrate knowledge, critically consider and solve complex issues, make decisions in difficult unpredictable conditions, formulate judgments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility; clearly and unambiguously convey your conclusions and knowledge, rationally substantiating them, to a professional and non-specialist audience.

General competences:

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

Special (professional) competences:

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.

Integrative final program learning outcomes (PLO), the formation of which is facilitated by the educational component:

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.

On specialized (professional, subject):

The ability to counseling and pharmaceutical care in the selection and delivery of non-prescription drug by assessing the risk / benefit ratio taking into account the possibility of the side effects development.

As a result of studying the educational component, the applicant for higher education will be

know:

- the possible side effects of each pharmacological group;
- the basic mechanisms of the drug side action;
- the kinds of negative drug actions that are related to pharmacodynamics, overdose and repeated drug administration;
- the conditions that increase or reduce these negative manifestations;
- peculiar properties of the complications in the different age-specific groups (children, the elderly patients, women in the periods of pregnancy and lactation);
- the basic methods of the prevention and treatment principles.

be able to:

- determine the dependence of the drugs side effects action from their medicinal form;
- provide pharmacological characteristics of traditional and new medicines logically link pharmacodynamics with indications, and the main side effects with contraindications to the use of drugs;
- prevent the development of the side effects;

- substitute the medicinal form into another one in the case of the side effects development
 - identify signs of side effects of drugs, symptoms of overdose of potent and poisonous drugs;
- acquire:*
- basic concepts and terms of discipline;
 - information about the most common and rare side effects of drugs;
 - information on modern directions of create drugs to avoid the undesirable side effects.

4. The educational component structure

Names of content modules and topics	The amount of hours											
	full time study						part time study					
	the whole amount	including					the whole amount	including				
		l.	sem	Practical lessons	lab	self-study		l.	sem.	Practical lessons	lab.	self-study
1	2	3	4	5	6	7	8	9	10	11	12	13
Module 1. The side effects of drugs, affecting nervous system and the functions of the organs and the systems. Chemotherapy.												
Content module 1. General side effects of drugs. The side effects of drugs, affecting nervous system												
Topic 1. General side effects of drugs		1		1		1						
Topic 2. The pharmacotherapy complications in different age-specific groups (children, elderly patients, pregnancy women and in women in the lactation period).				1		1						
Topic 3. The side effects of drugs affecting afferent innervations.				1		1						
Topic 4. The sideeffects of drugs affecting efferent		1		3		3						

innervation.												
Topic 5. The side-action of nonsteroidal anti-inflammatory drugs, narcotic and non-narcotic analgesics		1		1		1						
Topic 6. The sideeffects of anti-allergic medicines						5						
Topic 7. The side effects of drugs affecting the central nervous system.		1		2		2						
Control of content module 1				3		6						
The whole amount of hours for the content module 1		4		12		20						
Content module 2. The side effects of drugs, affecting the functions of the organs and the systems. Chemotherapy.												
Topic 8. The side effects of drugs affecting the blood coagulation system, hemopoiesis and cerebral blood flow.		1				5						
Topic 9. The side effects of medicines, affecting cardiovascular system, diuretics, antigouty drugs.		1		3		3						
Topic 10. The sideeffects of the cellular and tissue metabolism correctors, vitamin containing drugs						5						

Topic 11. The side effects of medicines, affecting endocrine system, myometrium, contraceptives					3						
Topic 12. The side action of synthetic hypoglycemic medicines.					2						
Topic 13. The side-actions of chemotherapeutic drugs (sulphonamides , antibiotics, antivirals), the drugs for dysbiosis treatment.		1		2	3						
Topic 14. The side actions of chemotherapeutic medicines (antituberculous , antifungal, anti-tumor drugs).		1		1	5						
Topic 15. The sideactions of the medicines affecting the gastro-intestinal tract.					5						
Control of content module 2				3	7						
The whole amount of hours for the content module 2		8									
<i>The whole amount of hours for the modul 1</i>				9	38						
Semester credit/semester differential credit from module				3							
Semester											

exam												
<i>The whole amount of hours for the course</i>	90	8		24		58						

5. Contents of the educational component

MODULE 1. The side effects of drugs, affecting nervous system and the functions of the organs and the systems. Chemotherapy.

Topic 1. General side effects of drugs. The negative side effects (NSE) and the control of the drug safety. The basic stages of the drug safety research. The formation and development of the drug safety control. The general positions and objectives of the drug safety control. The factors contributing to the spread of the NSE. The recommendations on the improving of the drug safety control and the prevention NSE.

Topic 2. The pharmacotherapy complications in different age-specific groups (children, elderly patients, pregnant women and in women in the lactation period). The features of the pharmacotherapy complications in different age-specific groups (children, elderly patients, pregnancy women and in women in the lactation period). Teratogenic action of drugs. Mother's milk excretion of drugs. The conditions affecting the side effects of drugs. The interaction of drugs. The pharmaceutical (physic-chemical) interaction. The pharmacokinetic interaction (in absorption, deposition, biotransformation of drug). The pharmacodynamics interaction.

Topic 3. The side effects of drugs affecting afferent innervation: local anesthetics, astringent, coating, antacid agents and medicines containing volatile oils. Withdrawal syndrome. Addiction and drug dependence. Coma. Convulsions. Bradyarrhythmia. Collapse. Bulimia. Dyspeptic symptoms. Allergic reactions.

Topic 4: The side effects of drugs affecting efferent department. Myosis and mydriasis. Increased IOP. Dry eyes syndrome. Dry mouth. Hypo- and hypersalivation. Hyperthermia. Bronchospasm. Apnea. Syndrome "light circuit." Dyspeptic symptoms. Hyperkinesis and seizures. The atony of the gastrointestinal tract and bladder. Amnesic syndrome. Hypo- and hypertension. Peripheral vasospasm. Heart failure. Angina pectoris. Tachycardia. Hypo- and hyperglycemia. Pseudoallergic reactions. Withdrawal syndrome. The phenomenon of the first dose.

Topic 5. The side-action of non-steroidal anti-inflammatory drugs, narcotic and non-narcotic analgesics. The affection of the stomach and duodenum. Dyspeptic syndrome. Dysbiosis. Constipation, diarrhea. Enterocolitis. Pseudomembranous colitis. Liver and pancreas gland affection. Reye's syndrome.

Topic 6. The side effects of anti-allergic medicines. The reducing of the concentration. Drowsiness. Fatigue. Vestibular disorders. Paresthesia. Myopathy. Cardiotoxic action. Anemia. Dyspepsia. Tachyphylaxis. Dysphonia.

Topic 7. The side-effects of drugs affecting the central nervous system. Headache, dizziness. Amnesic and epileptic syndromes. Sleep disorders. Extrapyramidal disorders, parkinsonism. Dyskinesia, akathisia, tremor. Dystonia. Sedative action. Depressive syndromes and psychosis.

Topic 8. The side effects of medications affecting the blood coagulation system, hemopoiesis and cerebral blood flow. Drug fever. Hemorrhage. Thrombophlebitis. DIC. Anemia. Arrhythmias. Exotoxic shock. Hepato- and nephrotoxicity. Withdrawal. Allergy. Encephalopathy. Depression.

Topic 9. The side-effects of medicines, affecting cardiovascular system, diuretics, antigouty drugs. Arterial hypertension, orthostatic hypotension. Drug-induced hypertension and hypertensive crises. Cardiotoxic action of the medicines (arrhythmias). The side-action of diuretics. Hypo- and hyperkalemia. Alkalosis (hypochloremic) and acidosis (metabolic). Hyperglycemia. The reduction of sodium, magnesium, calcium content. The disturbances of the sexual function. The acute and chronic kidneys damages, affection of urinary tract. The drug uses by patients with renal

insufficiency.

Topic 10. The side effects of the cellular and tissue metabolism correctors, vitamin containing medicines. The disturbances of metabolism. Hypervitaminosis.

Topic 11. The side effects of medicines, affecting endocrine system, myometrium, contraceptives. Immunosuppressive activity of the drugs. The defeat of thyroid gland - hypothyroidism, hyperthyroidism. The disturbances of mineral metabolism in the destruction of parathyroid glands. Hyperglucocorticoidism. Gynecomastia, galactorrhea. Musculinisation, feminization, virilization. The disturbances of carbohydrate metabolism. Hyperglycemic syndromes. Cushing's syndrome. The side-action of contraceptive medicines. Estrogen- and gestagen-induced complications. The disturbances of the sexualfunction.

Topic 12. The side-action of synthetic hypoglycemic medicines. The disturbances of carbohydrate metabolism. Hyperglycemic syndromes. Allergic reactions.

Topic 13. The side-action of chemotherapeutical medicines (sulphonamide medicines, antibiotics, antiviral), the drugs for dysbiosis treatment. The toxic-allergic affection of vision and hearing. The drug-induced conjunctivitis, keratoconjunctivitis. The disturbances of accommodation. Kidneys damage, urinary tract. The affection of skinand muscles. Dermatitis. The affection of the gastrointestinal tract, liver and pancreas gland. Dyspeptic syndrome. Dysbiosis. Enterocolitis. Pseudomembranous colitis.

Topic 14 The side-action of chemotherapeutical medicines (antituberculous, antiviral, antifungal, antitumour medicines). The toxic-allergic affection of vision and hearing. The drug-induced conjunctivitis, keratoconjunctivitis. The disturbances of accommodation. The affection of liver, kidneys and urinary tract. Immunosuppressive activity of drugs.

Topic 15. The side-action of the medicines affecting the gastro-intestinal tract. Dyspepsia. Hepatitis, hepatic and renal insufficiency. The disturbances of the gastric juicesecretion.

6. Topics of lectures

№	Name of topic	The amount in hours	
		full time study	part time study
1	General side effects of drugs.	1	
2	The side effects of medicines affecting efferent innervation	1	
3	The side effects of medicines affecting CNS.	1	
4	The side effects of medicines affecting cardiovascular system, diuretics, antigouty drugs.	1	
5	The side effects of chemotherapeutical medicines (sulphonamides, antibiotics, antivirals)	1	
6	The side effects of chemotherapeutical medicines (antituberculous, antifungal, anti-tumor drugs)	1	
7	The side effects of medicines affecting blood system.	1	
8	The side effects of medicines affecting endocrine system, myometrium, contraceptives	1	
The whole amount of hours		8	

7. Topics of seminars

Not provided a working curriculum

8. Topics of practical lessons

№ з/п	Name of topic	The amount of hours	
		full time study	part time study
1	General side effects of drugs.	2	
2	The side effects of medicines affecting afferent innervation	1	
3	The side effects of medicines affecting efferent innervation	3	
4	The side effects of pain, inflammation and allergy correctors	1	
	The side effects of medicines affecting CNS	2	
5	Control of content module 1.	3	
6	Side effects of drugs affecting the cardiovascular system	2	
7	The side effects diuretics, antihypertensive drugs	1	
8	The side effects of chemotherapeutic medicines (sulphonamides, antibiotics, antivirals)	2	
9	The side effects of chemotherapeutic medicines (antituberculous, antifungal, anti-tumor drugs)	1	
12	Control of content module 2	3	
13	Credit	3	
The whole amount of hours		24	

9. Topics of laboratorial lessons

Not provided a working curriculum

10. Self-study work

№ з/п	Name of topic	The amount of hours	
		full time study	part time study
1	Preparation for practics - theoretical preparation	28	
2	Independent working topics	30	
2.1	The sideeffects of anti-allergic medicines	5	
2.2	The side effects of the cellular and tissue metabolism correctors, vitamin containing drugs	5	
2.3	The side effects of drugs affecting the blood coagulation system, hemopoiesis and cerebral blood flow	5	
2.4	The side effects of medicines, affecting endocrine system, myometrium, contraceptives. The side actions of synthetic hypoglycemic medicines.	5	
2.5	The side actions of chemotherapeutic medicines (antituberculous, antifungal, anti-tumor drugs).	5	
2.6	The sideactions of the medicines affecting the gastro-intestinal tract	5	
The whole amount of hours		58	

Tasks for Self-study work

1. The negative side effects of medicines in children, pregnant women and elderly patients.
2. The main side effects of local anesthetics, astringent, coating, antacid agents and medicines containing volatile oils. The mechanisms of the side effects development.
3. The main side effects of anti-allergic medicines. The dose-side effect correlation. The possible prevention of the side effects development.
4. The main side effects of drugs affecting the blood coagulation system and

hemopoiesis. The mechanisms of the sideeffects development. The possible prevention of the side effects development.

5. The side effects of the cellular and tissue metabolism correctors. The side effects of the vitamin containing medicines. The mechanisms of the side effects development. The dose-side effect correlation.
6. The side effects of medicines affecting endocrine system. The mechanisms of the side effects development.
7. The side effects of synthetic hypoglycemic medicines. The possible prevention of the side effects development.
8. The side effects of antituberculous, antifungal, antitumor drugs. The mechanisms of the side effectsdevelopment.
9. The side effects of medicines affecting the gastro-intestinal tract.

11. Criteria and evaluation order of educational outcomes

The student's success in the semester (module) is evaluated on a 100-point scale, which consists of the current monitoring of theoretical and practical training in each lesson, independent work, as well as the results of intermediate module monitoring.

The minimum number of points assigned to students of higher education when learning a module (credit) is 60.

Calculation schemes and distribution of points

Current testing and independent work																sum	
Content modul 1							Content modul 2									100	
T1	T2	T3	T4	T5	T6	T7	TMC1	T8	T9	T10	T11	T12	T13	T14	T15		TMC2
5	5	5	5	5	5	5	15	5	5	5	5	5	5	5	5		10

The rating of the current control is calculated according to the cumulative principle. Depending on the curriculum of the current academic year, the number of classes in the semester and the assessment of the practical class may vary, but the overall rating is based on the ECTS scale. Current control includes assessment of theoretical knowledge, practical skills and independent work of the student, as well as control of the content module, and is conducted during classroom classes. Control of classroom work is carried out at each practical lesson in accordance with specific goals. Includes oral survey, individual interview, testing, assessment of practical tasks. Control of independent work assesses the level of knowledge that students acquire independently during self-preparation for classes, as well as by working out the list of questions included in certain modules. At the practical lesson, the student of higher education is assessed according to the criteria listed in Table 1. The scale of conformity of the rating of the content module, the current rating and the final module control is given in Table 2.

Table 1. Criteria for evaluating the results of educational activities in a practical lesson

Points	Criteria for evaluation
5	The applicant of higher education has a full study material, freely, independently and arguably describes it in oral or written answers, deeply and comprehensively reveals the content of theoretical questions and practical problems, using the obligatory and additional literature. Correctly responded to 90-100% of tests (<i>14-15 tests</i>).
4,5	The applicant of higher education is sufficiently fluent in teaching material, substantiates his teaching during oral or written answers, basically reveals the content of theoretical

	questions and practical tasks, using the obligatory literature. But when teaching some issues, there is not enough depth and argument, some minor errors are allowed. Correctly answered 82-89% of tests (<i>12-13 tests</i>).
4	A applicant of higher education generally has a training material, sets out its main content during oral or written answers, but without a thorough comprehensive analysis, justification and argumentation, without the use of the necessary literature, while admitting some significant errors. Correctly answered 74-81% of tests (<i>11-12 tests</i>).
3,5	A applicant of higher education does not have full knowledge of the educational material. Fragmentarily, superficially (without substantiation and argumentation) lays it out in oral or written responses, does not adequately reveal the content of theoretical questions, while admitting significant inaccuracies. Correctly answered 64-73% of tests (<i>10-11 tests</i>).
3	A applicant of higher education has a part in teaching material. Displays the content of only certain theoretical issues, while admitting significant errors. Correctly answered 60-63% of tests (<i>9-10 tests</i>).
0-2	The applicant of higher education does not possess the educational material partly and is unable to put it, does not understand the content of theoretical issues and practical tasks. Correctly answered 0-59% of tests (<i>0-8 tests</i>).

Table 2. Transformation of the national assessment scale into the ECTS system (European Assessment Transfer System. Eng. European Community Course Credit Transfer System)

Total points for all kinds of educational activities	Mark of ECTS	Mark of national scale
		To discipline (modules 1, 2, 3)
90 – 100	A	perfectly
82-89	B	fine
74-81	C	
64-73	D	satisfactorily
60-63	E	
35-59	FX	unsatisfactorily with possibility of re-drafting
0-34	F	unsatisfactorily with obligatory re-teaching of discipline

Grades A, B, C, D, E are assigned only to students who have completed all modules in the discipline.

The subject grade FX, F is assigned to higher education applicants who have not been credited with at least one module in the discipline after completing its study.

The grade FX ("2") is assigned to higher education applicants who have received the minimum number of points for the current educational activity, but have not passed the modular final control. They have the right to repeat the final module control no more than 2 times during the winter vacation and during 2 (additional) weeks after the end of the spring semester according to the schedule approved by the rector.

Applicants of higher education who received an F grade at the end of the discipline (did not complete the curriculum of at least one module, or did not score the minimum number of points for the current educational activity of the module) must undergo repeated training according to an individual curriculum.

12. Forms of progress and semester supervision of academic achievements

During the study of the discipline, all types of student activities are subject to control: current (at each lesson), intermediate (checking the mastery of content modules). In each module, there are three ongoing control of mastering content modules.

Current control is carried out at each lesson in accordance with the specific goals of the

topic, during the individual work of the teacher with the student for those topics that the student works on independently.

Forms of current control: oral survey, performance of exercises (auditor tasks), test control, control work; intermediate control: in the form of written work and testing (assessment). The final control of module 2 is conducted in the form of a semester exam.

Form of final control of study success: module 1 – semester credit, module 2 – semester exam.

13. Methodological support

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.

14. Reading suggestions

The main reading suggestions

1. Pharmacology-Cito! Textbook / Edited by S.M. Drogovoz. – Kharkiv: 2012. – 192 p.
2. Pharmacology at your palms: reference book / Drogovoz S.M., Kutsenko T.A. – Kharkiv: NphaU, 2010. – 80 p.
3. Pharmacology : summary of lectures on special pharmacology (part I) / S.M. Drogovoz, T.A. Kutsenko. – Kharkiv: NPhaU, 2009. – 72 p.
4. Pharmacology : summary of lectures on special pharmacology (part II) / S.M. Drogovoz, T.A. Kutsenko, A.Yu. Pozdnyakova et al. – Kharkiv: NUPh: Golden Pages, 2012. – 80 p.
5. Pharmacology : manual for practice on special pharmacology (part I) / S.M. Drogovoz, T.A. Kutsenko. – Kharkiv: NPhaU, 2012. – 68 p.
6. Pharmacology : manual for practice on special pharmacology (part II) / S.M. Drogovoz, T.A. Kutsenko, A.Yu. Pozdnyakova et al. – Kharkiv: NUPh: Golden Pages, 2012. – 96 p.

Supplementary reading suggestions

1. Toxicology : Summary of lectures, practice and tests on toxicology / S.M. Drogovoz, T.A. Kutsenko, A.Yu. Pozdnyakova, V.A. Ulanova. – Kharkiv: NUPh: Golden Pages, 2011. – 88 p.
2. Pharmacology : a textbook / Viktor M. Bobyrov, Tetyana O. Devyatkina, Olena M. Vazhnicha, Vadim M. Khristyuk. – Vinnytsya: NOVA KNYHA Publishers, 2010. – 520 p.
3. Chekman I.S., Gorchacova N.O., Panasenکو N.I., Bech P.O. Pharmacology. - Vinnytsya: NOVA KNYHA Publishers, 2006. – 384 p.
4. Firdaus M. Review of Pharmacology, 7th edition. – Karachi : Riaz Medical Publishers, 2007. – 190 p.
5. Ganziy T.V. Study Guide to Basic Pharmacology. – Kharkiv, Fakt, 2005. – 264 p.
6. Katzung B.G. Basic and Clinical Pharmacology, 9th edition. – New-York: Lange, 2004. – 1202 p.
7. Lippicott`s. Illustrated Reviews: Pharmacology, 4th Edition / Ed.: R. Finkel, M.A. Clark, L.X. Cubeddu. – Lippicott Williams Wilkins, 2008. – 560 p.

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.
9. Stefanov O., Kucher V. Pharmacology with General Prescription^ a textbook for English-speaking students, 2th edition. – K., 2007. – 318 p.
10. Ukrainian edition of Dorland's Illustrated Medical Dictionary, 32 the edition. In 2 volums- Lviv: Nautilus, 2011. – 2176 p.

15. Electronic resources, including the Internet

1. Internet resources:

- State service of Ukraine for medicinal products // <http://dls.gov.ua>
- Journal of pharmacology and pharmacotherapy // www.jpharmacol.com
- Journal ScienceRise: Pharmaceutical Science // http://journals.uran.ua/sr_pharm/about
- Journal of medical affairs // <https://liksprava.com/index.php/journal>

2. Open access databases (<https://lib.nuph.edu.ua/news-category/bazi-danikh/>).

3. Databases Scopus (Elsevier); Web of Science (Clarivate analytics); ScienceDirect; Hinari, AGORA, ARDI, GOALI, OARE на платформі Research; Life;

4. Library of NPHU // <http://nuph.edu.ua/ru/nauchnaya-biblioteka>; E-mail: library@nuph.edu.ua

5. Website of the Department of Pharmacology and Pharmacotherapy NPHU

// [http:// pharmacolpharmacother.nuph.edu.ua](http://pharmacolpharmacother.nuph.edu.ua); E-mail: pharmacolpharmacother@nuph.edu.ua