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

PHARMACOLOGY

(the name of educational component)

WORK PROGRAM
of educational component

training for second master level
(Higher Educational Level Name)
in specialty 226 Pharmacy, industrial Pharmacy
(Code and Specialty Name)
field of knowledge «22 Publik Health
(Code and Knowledge Field Name)
of educational program Pharmacy
(Educational Program Name)
in specialization(s)
(name of specialization, if available)

Kharkiv-2022
(year of creation)

The work program of the educational component Pharmacology in specialty 226 Pharmacy, industrial Pharmacy educational program Pharmacy in specialization(s) Фм20*(4,10д)англ for applicants for higher education 3 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 «23» August 20 22№ 1

Head of the Department _____ prof. Sergiy SHTRYGOL'
(sig.) (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
(підпис) (first name LAST NAME)

1. Description of the educational component

Language of study: English

Status of the educational component: compulsory

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, 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.

The subject of educational component study «Pharmacology» is there are pharmacological properties, conditions for the rational use of modern medicines and a purposeful search for new medicines.

Information content of the educational component. 10 ECTS credit **300** 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 «Pharmacology» is is pharmacological properties, the conditions of modern rational use of medicines and targeted search for new drugs.

The main tasks of the educational component «Pharmacology» is acquisition by students the necessary knowledge about the route of administration, types of action, dosage of drugs, mechanisms of action, pharmacodynamics, pharmacokinetics, indications, side effects and contraindications, interchangeability medicines each pharmacological group stages of medicines as well as identifying the main areas of scientific ideas and trends pharmacology.

3. Competence and planned educational outcomes

Educational component «Pharmacology» 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:

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

Special (professional) competences:

PC 1. Ability to conduct sanitary and educational work among the population to prevent common diseases, prevent dangerous infectious, viral and parasitic diseases, as well as to facilitate the timely detection and maintenance of adherence to treatment of these diseases in accordance with their medical and biological characteristics and microbiological characteristics.
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.
PC 6. Ability to identify medications, xenobiotics, toxins and their metabolites in body fluids and tissues, to conduct chemical and toxicological tests to diagnose acute poisoning, drug and alcohol intoxication.

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.

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

know:

- the concept of "original drug", "brand", "generic", "optical isomers", "biotech drugs", etc.;
- basic terms and principles of pharmacological classification of drugs;
- routes of administration of drugs in the body and the types of action of drugs;
- pharmacodynamic and pharmacokinetic factors that affect the efficacy and safety of drugs;
- phenomena that occur with repeated and combined administration of drugs;
- classification of doses and principles of drugs dosing;
- classification of drugs that affect the peripheral nervous system;
- pharmacological logic between and pharmacodynamic indications for use of drugs affecting the peripheral nervous system and antiallergy medicines;
- the main signs and symptoms of side effects of an overdose of drugs mediator type of algorithm of performance of first aid;
- principles of classification of anti-inflammatory drugs;
- classification of of drugs that affect the central nervous system;
- pharmacological logic between pharmacodynamics and indications for use of drugs that affect the central nervous system, anti-inflammatory drugs;
- differentiate neurotropic and psychotropic action of drugs;
- comparison characteristics of drugs for each pharmaceutical group in strength and duration of pharmacological action;
- pharmacokinetic and pharmacodynamic features of drugs that affect the central nervous system, anti-inflammatory and anti-allergy drugs, depending on their chemical structure, routes of administration dosage forms;
- basic ways of pharmacological influence on the function of the executive bodies, blood system, metabolism and immune system;
- classification of drugs that affect the function of the executive bodies, blood system, metabolism and immune system;
- know the logic between pharmacological and pharmacodynamic indications for use of drugs that affect the function of the executive bodies, blood system, metabolism and immunity;
- modern classification of drugs that used to treat cancer and infectious diseases, antiseptics and disinfectants;
- the main manifestations of side effects of chemotherapy drugs;
- learn the basic rules of rational antibiotic therapy to prevent of side effects and development of antibiotic resistance;

do:

- determine the dependence of drugs action from their medicinal form;
- identify the group affiliation of essential medicines under modern classifications;
- 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;
- evaluate the indications and contraindications to the use of essential medicines;
- substantiate selecting the appropriate medicinal form according to route of administration;
- Identify signs of side effects of drugs, symptoms of overdose of potent and poisonous drugs;
- conduct search of information in modern pharmacological reference books and professional journals;

have:

- basic concepts and terms of discipline;
- information on the basic and advanced medicinal forms in each pharmacological group of drugs;
- information about modern medications in each pharmacological group of drugs;

- information on modern directions of create drugs and international standards for drug quality during clinical trials.

1. The educational component structure

Names of content modules and topics	The amount of hours											
	full time study						part time study					
	the whole amount	including				self-study	the whole amount	including				self-study
		l.	sem	Practical lessons	lab			l.	sem.	Practical lessons	lab.	
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
Module 1. General pharmacology. Medicines affecting peripheral nervous system and neurotransmitter processes. Medicines affecting GIT functions												
Content module 1. General pharmacology. General prescription												
Topic 1. Introduction to prescription writing. Prescription writing of solid and soft medicinal forms	9			3		6						
Topic 2. Rules of liquid medicinal forms prescription writing	9			3		6						
Topic 3. General pharmacology. Kinds of action and routes of administration of drugs. The mechanisms of action, pharmacodyna-mics and pharmacokinetics of drugs	10	1		3		6						
Topic 4. General pharmacology. Classification and principles of the drug dosing. The phenomena that occur during the repeated and com-bined administra-tion of drugs. Side effects of drugs	10	1		3		6						
Control of content module 1	6			3		3						
The whole amount of hours for the content	44	2		15		27						

module 1												
Content module 2. Medicines affecting peripheral nervous system and neurotransmitter processes. Pharmacological correctors of allergy, pain and inflammation												
Topic 5. Drugs affecting the afferent innervation	12			3		9						
Topic 6. Medicines affecting efferent innervation. Cholinergic agonists and antagonists	14	2		6		6						
Topic7. Medicines affecting efferent innervation: pharmacological description of adrenergic agonists and antagonists	8	2		3		3						
Topic 8. Pharmacological correctors of allergy	3	1		1		1						
Topic 9. Pharmacological pain correctors. Means for anesthesia, alcohol	12	2		2		8						
Topic 10. Nonsteroidal anti-inflammatory drugs	3	1		1		1						
Control of content module 2	6			2		4						
The whole amount of hours for the content module 2	58	8		18		32						
Content module 3. Drugs that affect the function of the CNS and GIT												
Topic 11. Psychotropic drugs of suppressive action: neuroleptics, tranquilizers, sedatives, hypnotics	7	1		3		3						
Topic 12. Neurotropic drugs with a depressing effect:	7	1		3		3						

anticonvulsants, antiparkinsonian drugs												
Topic 13. Psychotropic drugs of excitatory action. Analeptics. Psychostimulants. Antidepressants.	7	1		3		3						
Topic 14. Neurotropic drugs of stimulatory action. Nootropics. Actoprotectors. Adaptogens	7	1		3		3						
Topic 15. Drugs affecting gastrointestinal tract	14	2		6		6						
Control of content module 3	6			3		3						
The whole amount of hours for the content module 3	48	6		21		21						
The whole amount of hours for the modul 1	**150**	**16**		**54**		**80**						
Module 2. Drugs that affect the functions of the executive organs, metabolism, blood and immune system. Chemotherapeutic drugs												
Content module 4. Drugs that affect the functions of the executive organs												
Topic 16. Drugs that affect the functions of the respiratory system	6			4		2						
Topic 17. Cardiotonic agents. Anti-arrhythmic agents	4	1		2		1						
Topic 18. Anti-anginal drugs, cardioprotectors	4	1		2		1						
Topic 19. The pharmacological characteristics of cerebral blood flow disorders correctors. Anti-atherosclerotic medicines	5			2		3						
Topic 20. Antihypertensive and hypertensive	10	2		4		4						

drugs												
Topic 21. Diuretics. Antigo-uts. Drugs that affect the myometrium	4	1		2		1						
Control of content module 4	8			4		4						
The whole amount of hours for the content module 4	41	5		20		16						
Content module 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; anti-hypoxants and antioxidants	10			4		6						
Topic 23. Drugs that affect blood coagulative system	4	1		2		1						
Topic 24. Drugs that affect blood formation. Pharmacology of iron medicines. Correctors of leucopoiesis	4	1		2		1						
Topic 25. Drugs with activity of hormones of the hypothalamus, pituitary, epiphy-sis, thyroid, para-thyroid gland. Insulins. Synthetic hypoglycemic drugs	8	2		4		2						
Topic 26. Drugs with activity of adrenal gland hormones and gonads. Anabolic steroids	8	2		4		2						
Control of con-tent module 5	8			4		4						
The whole amount of hours for the content module 5	42	6		20		16						

Content module 6. Chemotherapeutic drugs												
Topic 27. Antiblastomic drugs. The principles of treatment of poisoning by drugs and substances. Antidotes. Radioprotectors	6					6						
Topic 28. Synthetic antibacterial drugs. Sulfonamides. Fluoroquinolones. Antituberculous medicines	7	1		4		2						
Topic 29. Antibiotics: penicillins, cephalosporins, monobactams, carbapenems, macrolides, tetracyclines	7	1		4		2						
Topic 30. Antibiotics of different groups: aminoglycosides, glycopeptides, lincosamides, polymyxins, chloramphenicols, rifamycins etc	7	1		4		2						
Topic 31. Antiviral, antifungal and antihelminthic drugs	8	2		4		2						
Topic 32. Antiprotozoal and antispirochetal drugs. Antiseptics and disinfectants	3,5					3,5						
Control of content module 6	6			4		2						
The whole amount of hours for the content module 6	44,5	5		20		19,5						
The whole amount of hours for the modul 2	**128**	**16**		**60**		**51,5**						
Semester												

credit/semest er differen- tial credit from module												
Semester exam	**22,5**					**22,5**						
The whole amount of hours for the course	**300**	**32**		**114**		**154**						

5. Contents 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

Prescription writing and prescription. Functional parts of prescription. Forms of prescription. Analysis of the structure and content of the prescription. Classification of medicinal forms. Rules of solid and soft medicinal forms prescription writing. Solid medicinal forms: powders, tablets, glossets, draggee, granules, spansules, capsules, species, candies, pastilles. Soft medicinal forms: gels, ointments, pastes, liniments, suppositories, plasters.

Topic 2. Rules of liquid medicinal forms prescription writing

Rules of prescription writing of solutions for external use, emulsions, suspensions, syrups, lotions, lemonades, scented water, infusions and decoctions, tinctures, extracts, balms, newgalenic medicines, mixtures, solutions for injections. Different medicinal forms: eye films, aerosols and others. New medicinal forms and medical delivery systems (transdermal therapeutic systems, spacers, nebulizers, etc.). Common mistakes that occur in prescription. An algorithm of pharmacist's action in finding mistakes in the prescription.

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

Contents of pharmacology, its objectives and place among other pharmaceutical sciences. The main sections of pharmacology (general and particular). The main parts of development of pharmacology as a science. Modern trends in pharmacology. The law of Ukraine "About medicines". The system of state registration of medicines in Ukraine. Pharmacological "alphabet": the definitions of "medical substance", "individual pharmacological agent", "medicine" ("medication", "medicine", "remedy"), "pharmacological reaction", "pharmacological effect", "pharmacodynamics", and "pharmacokinetics" of drugs. Nomenclature of drugs: chemical, international non-proprietary (INN), commerce. Principles of classification of drugs. International ATC-classification of drugs. Stages of development and introduction of new drugs. The original (innovative) and generic medicins. International standards of medicines quality at the stage of pre-clinical (toxicological and pharmacological) research. The concept of GLP. Types of drugs action on the organism: local, resorptive, reflex, main, side, direct, reversible, irreversible, positive, negative, selective, stimulating, etiotropic, pathogenetic, symptomatic, preventive, substitutive. Routs of administration of medicines to the organism. Comparison of enteral and parenteral routes of administration of drugs. Risk/benefit ratio during election of the route of administration. The mechanisms of the pharmacological effect realisation. The nature and essence of the interaction between a drug and components of cell membranes. The participation of receptors and dependent channels in the mechanisms of action of drugs. General concepts of pharmacokinetics: absorption, distribution (deposit), metabolism (biotransformation) and excretion of drugs. Factors affecting the

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

Drugs dosing. Classification and identification of doses. The pattern of "dose-effect". The safety indicators of medicines. Therapeutic window and therapeutic index (TI). The concept of pharmacogenomics and chronopharmacology. Drug idiosyncrasy. Classification of side effects of drugs. Side effects of drugs: drug allergy, embryotoxicity, teratogenic, fetotoxicity, mutagenic, carcinogenic effects. Specific undesirable (organotropic) effect of drugs. Phenomena that occur in combinde drug administration. Habituation, cumulation, drug addiction (psycologycal dependence), dysbiosis, synergism, antagonism. The system of pharmacosupervision in the world and in Ukraine. The role of pharmacists in ensuring the rational use of drugs and the prevention of 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

Classification of drugs that are mainly active in the site of afferent nerves (agents of inhibiting and stimulating type of action). Agents with inhibiting type of action: local anesthetics (LA), astringent, coating, adsorbent, antacid agents, drugs containing volatile oils. Classification of LA on their chemical structure. Types of local anesthesia. Requirements to LA. Pharmacological and pharmaceutical aspects of combining of LA with drugs from other groups in various medicimal forms. Pharmacological characteristic of LA, astringent, coating, antacid agents, drugs containing volatile oils. Side effects of LA. Classification and pharmacological characteristics of sorbents. Principles of hemo-, plasma- and enterosorption. Pharmacological characteristic of medicines with stimulative effects: irritants, bitters, expectorants, emetic drugs, laxatives with reflex action, as well as medicines containing bees and snakes poison. Comparison of the drugs from these groups, peculiarities of their use in patients of all ages and pregnants.

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

The connection between physiological characteristics of the autonomic nervous system and mechanisms of pharmacological effect realisation of mediator type drugs. The concept about receptors (post-, pre-, out of synapses) and their endogenous or exogenous ligands. Selectivity of cholinotropic effect of mediator type medicines. The connection between physiological functions of the parasympathetic nervous system and pharmacodynamics of cholinergic medicines. Classification and pharmacological characteristic of cholinergic (cholinomimetics, antycholinaesterase) drugs. The mechanisms of side effects development. Acute poisoning with alkaloids of cholinotropic effect and phosphororganic substances. Pharmacological characteristics of cholinaesterase reactivators.

Classification and pharmacological characteristic of anticholinergic (M-cholinoblockers, ganglionic blockers, muscle relaxants) drugs. Pharmacological characteristic of M-cholinoblockers. Symptoms of poisoning by belladonna alkaloids and principles of antidote therapy. Pharmacological characteristic of ganglionic blockers. Features of the application of ganglionic blockers in the clinic. Pharmacological characteristic of muscle relaxants.

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

The connection between physiological functions of the sympathetic nervous system and pharmacodynamics of adrenotropic drugs. Types and localization of adrenergic receptors. Peculiarites of the nerve impulses transmission in adrenergic synapses. Effects of excitation of the sympathetic nervous system by the executive organs. Classification and mechanism of action of adrenotropics depending on the type and lokalization of adrenergic receptors. Pharmacological characteristic of adrenotropics (agonists, sympathomimetics, blockers and sympatholytics).

Pharmacological logic in the mechanism of action and pharmacodynamic paculiarites of adrenergic agonists and blockers, sympathomimetics and sympatholytics. The concept of cardioselectivity and internal sympathomimetic activity of adrenoblockers. The connection between pharmacodynamic and indications, side effects and contraindications of adrenotropics. Comparison of adrenomimetics and sympathomimetics, adrenoblockers and sympatholytics.

Topic 8. Pharmacological correctors of allergy

General determination of "Intermediants". Mechanism of action and pharmacodynamics of intermediants from the position of pharmacological role of dopamine, histamine, serotonin and prostaglandins in the body. Types of pharmacological correction of allergic reactions of immediate and delayed types. Classification and nomenclature of traditional and new anti-allergic medicines depending on their chemical structure, their generation, and mechanisms of action. Current understanding of the mechanisms of allergic reactions of different types development depending on their pathogenetic mechanism. Pharmacological characteristic of anti-allergic drugs: H_1-histamino-, serotonino-, leukotrieno- receptor blockers, inhibitors of leukotrienes synthesis, mast cell stabilizers, topical glucocorticosteroids. The logical connection between pharmacodynamics and indications of anti-allergic agents. Comparison of antiallergic agents. Side effects of anti-allergic drugs and the role of pharmacist in their prevention. Peculiarities of anti-flue drugs from OTC group containing H_1-histamine receptors blockers.

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

Ways of pharmacological correction of pain. The concept of nociceptive, antinociceptive system, opiate receptors (OR), and their physiological and pharmacological importance. Endogenous ligands of OR. Classification of narcotic analgesics (NA) depending on their chemical structure and affinity to OR. Pharmacological characteristic of NA. Potentiation of the neuroleptics, non-narcotic analgesics and medicines from other groups by NA. Mechanisms of side effects development: addiction, abstinence syndrome after prolonged administration of drugs. Signs of acute intoxication by NA. The algorithm of first aid in case of poisoning by NA. Pharmacological characteristic of antagonists of OR. Drug dependence on NA and the role of the pharmacist in its preventio. The social nature of addiction. Pharmacological characteristics of non-narcotic analgesics, analgesics-antipyretics, spasmoanalgesics. The terms of rational use. Side effects and their prevention. Comparison of narcotic and non-narcotic analgesics and combined agents.

The history of the general anesthetics discovery. Modern requirements for general anesthetics. Classification of general anesthetics. Pharmacological characteristic of general anesthetics for inhalative and non-inhalative anesthesia. Peculiarities of routes of administration and dosing for general anesthetics. The comparison of general anesthetics. The concept of premedication, introducting, basic and combined general anesthesia. Classification of alcohols. The pharmacological characteristic of alcohols (ethanol, camphor, boric), peculiarities of their pharmacodynamics when the medicines are applied topically. The use of ethanol in the medical and pharmaceutical practice. The algorithm of first aid in acute poisoning with ethyl alcohol. Pharmacological characteristic of drugs for the alcoholism treatment. The role of the pharmacist in prevention the effects that occur in case of combined administration of alcohol and drugs, and abuse of alcohol containing drugs.

Topic 10. Nonsteroidal anti-inflammatory drugs

The role and place of anti-inflammatory drugs in pharmacotherapy of inflammation as the most typical pathological process. The classification and nomenclature of modern nonsteroidal anti-inflammatory drugs (NSAIDs) depending on their chemical structure, origin and degree of selectivity to cyclooxygenases. Modern views on the mechanism of action of NSAIDs dealing with the cyclooxygenase concept. Pharmacological characteristic of NSAIDs. Comparison of traditional and new NSAIDs. The logical connection between pharmacodynamics and indications, side effects and contraindications of NSAIDs. The role of the pharmacist in providing conditions for rational use of NSAIDs. Prospects of the NSAIDs creation with non-traditional mechanism of action.

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

Topic 11. Psychotropic drugs with inhibitory action. Antipsychotics. Tranquilizers. Sedatives.
The concept of antipsychotics and neurotropic action of drugs. Classification of neuroleptics depending on their chemical structure. Pharmacological characteristic of neuroleptics. Differences between antipsychotic and neuroleptic action. The logical connection between the mechanism of action and pharmacological effects of neuroleptics. Mechanisms of side effect of neuroleptics development in case of their prolonged administration and its prevention. Neyroleptanalgezia as an example of potentiateve synergism of narcotic analgesics and neuroleptics. Comparison of neuroleptics from different groups. Pharmaceutical peculiarities of phenothiazines. Classification of tranquilizers depending on their chemical structure and on their influence on the nervous system. The concept of the GABA-benzodiazepine complex. Pharmacological characteristic of tranquilizers. The differences between tranquilizers and neuroleptics. Drug dependence on tranquilizers and pharmacist role in its prevention. Terms of rational use of tranquilizers. Classification of sedative drugs in their origin. Pharmacological characteristics of bromides, sedative herbal drugs and combined ones. Clinical signs of bromism and measures to prevent it. Achievments of psychopharmacology of XXI century.

Topic 12. N**eurotropic drugs with inhibitory action. Hipnotics. Anticonvulsants. Antiparkinsonian drugs**
The definition of "hypnotics". Modern requirements for "ideal" hypnotics. Classification of hypnotics depending on their chemical structure. Pharmacological characteristic of hypnotics, their influence on the architectonic of sleep. Dependence of hypnotics pharmacological action (fallimg asleep speed, sleep duration, presence of postsleeping disorders) on their chemical structure. The phenomenon of "enzyme inductiors" under the influence of barbiturates and their pharmacological importance. Comparison of hypnotics from different groups. The terms of rational administration of hypnotics. Acute poisoning by hypnotics and measures to prevent them. Anticonvulsants. The concept of epilepsy and convulsions, "status epilepticus", "eclampsia." Classification of anticonvulsants depending on their chemical structure. Pharmacological characteristics of anticonvulsants. Comparison of drugs of different groups. The terms of rational administration of anticonvulsants in case of prolonged use. The role of the pharmacist in the prevention of their side effects. Pharmacology of magnesium sulfate. Antiparkinsonian drugs. Ways of pharmacological correction of Parkinson's disease, the definition of "medical parkinsonism." Classification of antiparkinsonian drugs and their pharmacological characteristics. Comparison of antiparkinsonian drugs from different groups. The terms of rational administration of antiparkinsonian drugs with prolonged administration. Pharmacological characteristic of drugs that eliminate muscle spasticity of central action genesis.

Topic 13. Psychotropic and neurotropic drugs with excitatory action. Psychostimulants. Antidepressants.
Classification of psychostimulants depending on their chemical structure. Pharmacological characteristics. Peculiarities of their use in clinical practice. Mechanisms of addiction development to amphetamines. Antidepressants. Classification of antidepressants depending on their chemical structure, mechanism of action. Typical and atypical antidepressants, their pharmacological characteristics. Peculiarities of antidepressants in psychiatric and therapeutic practice. Pharmacological characteristics of normothymics.

Topic 14. Psychotropic and neurotropic drugs with excitatory action. Nootropics. Analeptics. Actoprotectors. Adaptogens
Classification of nootropics depending on their chemical structure, mechanism of action. Pharmacological characteristics nootropics. Peculiarities of theit use in heriatry, gynecology, neurology, psychiatry, ophthalmology, etc. Pharmacological characteristics of cerebroprotectors.
Analeptics: classification by the mechanism of action, pharmacological characteristics. Comparison of analeptics depending on their strength of action, the predominant influence on different parts of the CNS. Actoprotectors: pharmacological characteristics. Adaptogens: classification of adaptogens depending on their origin, pharmacological characteristics. Terms of rational use of drugs that

stimulate the central nervous system.

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

Classification and pharmacological characristics of drugs that stimulate appetite (bitters, insulin, anabolic steroids, psychotropic drugs) or reduce appetite (anorexigenic agents). Classification and pharmacological characteristics of emetic and anti-emetic drugs (serotonin and dopamine receptors blockers, M-cholinoblockers, H_1-histaminoreceptors blockers). Classification and pharmacological characteristics of drugs that affect the secretory function of the stomach. Pharmacological characteristics of stimulants of gastric juice secretion and substitutive therapy. Pharmacological characteristics of drugs that reduce the secretion of gastric glands (H_2-histamine receptors blockers, proton pump inhibitors, M_1-cholinoreceptors blockers) gastroprotectors, antacids. Comparison of antacid of I-IV generations.

Classification and pharmacological characteristics of drugs that regulate motor function of the gastrointestinal tract: propulsants, antispasmodics, antidiarrheal, laxatives. Comparison of medicines and terms for their rational use. Classification and pharmacological characteristics of hepatoprotectors, choleretic (choleretics, cholekinetiks) and cholelytics. Achievements of Ukrainian scientists in development new natural and synthetic hepatoprotectors.

The final test of modul 1.

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

Classification and pharmacological characteristics of the respiratory stimulants. Comparative characteristics of drugs of central and peripheral actions. Features of use in intensive care, neonatology, pulmonology. Classification and pharmacological characteristics antitussive drugs with central and peripheral action. The logical connection between side effects and contraindications to their use. Classification and pharmacological characteristics expectorants and mucolytics. Features of sustainable use of plant origin expectorants. Classification and pharmacological characteristics of drugs that stimulate surfactant synthesis and exogenous pulmonary surfactant. Classification and pharmacological characteristics bronchodilator drugs. The logical connection between the mechanism of action and pharmacodynamics, side effects and contraindications to the use of bronchodilators of different groups (β-agonists, M-cholinoblockers, myotropic ispasmolytics). Modern formulations and therapeutic systems for inhalation bronchodilators. Pharmacological foundation of combined use of bronchodilators with anti-allergic and anti-inflammatory steroid drugs.

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

Classification of cardiac glycosides (CG) in origin and their pharmacological characteristics. The difference in cardiotonic and cardiostimulative action. The problem of efficacy and safety of cardiac glycosides and their toxicity. The therapeutic window of CG. Peculiarities of dosing of CG (digitalisation). Clinical manifestations of intoxication by CG, their prevention. Pharmacological characteristics of nonglycoside cardiotonics. Classification and pharmacological characteristics of anti-arrhythmic agents. Peculiarities of use of anti-arrhythmic agents, depending on the mechanism of occurrence and type of arrhythmia. Terms of rational use of anti-arrhythmic agents.

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

Classification and pharmacological characteristics of anti-anginal drugs. Classification of organic nitrates in chemical structure, pharmacokinetic profile. Modern medicinal forms of organic nitrates, their pharmaceutical characteristics. Peculiarities of organic nitrates use depending on the medicinal

form and pharmacokinetics. The logical connection between the side effects of organic nitrates and contraindications. The mechanism of tolerance to nitrates and ways of pharmacological correction. Pharmacological characteristics of SH-groups donors. Classification and pharmacological characteristics of β-adrenoblockers. Peculiarities of pharmacodynamics of β-blockers, depending on the presence or absence of cardioselectivity, intrinsic sympathomimetic activity, vasodilative effect. Terms of rational use of β-adrenoblockers. Classification and pharmacological characteristics of slow calcium channel blockers. Peculiarities of pharmacodynamics of slow calcium channel blockers depending on the medicinal form and their chemical structure. Anti-anginal agents with reflex action: mechanism of action, pharmacodynamics, peculiarities of the administration. Pharmacological characteristics of new antianginal drugs - selective inhibitors of f-channels of sinus node (ivabradine). Classification and pharmacological characteristics of cardioprotectors, antioxidants.

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

Classification and pharmacological characteristics of cerebral blood flow disorders correctors (calcium channel blockers, uterine horn derivatives, Ginkgo Biloba drugs, etc.). The logical relationship between side effects and contraindications to cerebral circulation disorders correctors circulation. Modern understanding of pharmacological correctors of atherosclerosis. Classification and nomenclature of anti-atherosclerotics. Pharmacological characteristics of statins, fibrates, bile acid sequestrants, nicotinic acid agents, anhioprotektors, essential phospholipids. Side effects of lipid-lowering drugs, contraindications. Terms of rational use of anti-atherosclerotics at their prolonged use.

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

The term "spasmolytic", "vasodilative" and "hypotensive" action. Classification of antihypertensives of central and peripheral action. Antihypertensive drugs of central action of the first and the second generations, their mechanism of action. Peculiarities of their pharmacodynamics and indications. Side effects and contraindications of antihypertensives of central action. Differences in the administration of short-acting and retard forms of α_1-adrenoblockers. Peculiarities of pharmacodynamics and indications of cardioselective and noncardioselective β-adrenoblockers, that do not have or have vasodilative properties. Side effects and contraindications of β-adrenoblockers. Sympatholytics: mechanism of action, pharmacodynamics. Comparison of sympatholytics, their uses and side effects. Pharmacological justification of ganglionic blockers use as antihypertensive drugs. Peculiarities of their pharmacodynamics depending on the pharmacokinetic profile. The logical connection between ganglionic blockers side effects and their contraindications. Classification of slow calcium channel blockers in chemical structure and generations. Pharmacological characteristics of slow calcium channel blockers. Comparison of slow calcium channel blockers of the next generation to the first generation (pharmacokinetic and pharmacodynamic properties, depending on the chemical structure and medical form). The main side effects of slow calcium channel blockers, contraindications.

Classification of ACE inhibitors on the chemical structure and pharmacokinetic characteristics. Pharmacological characterization of ACE inhibitors. The logical connection between the side effects of ACE inhibitors and contraindications. Classification of ACE inhibitors on the chemical structure and pharmacokinetic characteristics. Pharmacological characteristic of ACE. The logical connection between the side effects of ACE inhibitors and contraindications. Angiotensin II receptor antagonists as an alternative to ACE inhibitors (mechanism of action, pharmacodynamics peculiarities, differences comparing to ACE). Pharmacological characterization of peripheral vasodilators and antispasmodics with myotropic action. Pharmacological justification for the use of diuretic drugs in hypertension. Principles of their use.Combined antihypertensive drugs. Rational and irrational combinations of antihypertensive drugs. Drugs used in hypertensive crisis

elimination. Classification and pharmacological characteristics of drugs that increase blood pressure.

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

The common definition of "diuretics". Classification of diuretics on their mechanism of action, origin, nomenclature of diuretic drugs. Pharmacological characteristics of diuretics. Comparison of diuretic drugs based on mechanisms of action, peculiarities of pharmacodynamics and indications. Principles of rational combined administration of diuretics from different groups.

The common definition of "antigouts". Pharmacological characteristics of drugs affecting uric acid metabolism, inhibit the formation and facilitate the excretion of urinary calculi.

The common definition of "prostatoprotectors." Classification, nomenclature and pharmacological characteristics of prostatoprotectors considering their origin and composition (combined drugs). Side effects and contraindications. Classification, nomenclature and pharmacological characteristics of erectile dysfunction correctors. Risk/benefit ratio of their use in patients taking nitrovasodilators and other drugs.

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

Classification of vitamins and coenzyme medicines. Pharmacological characteristics of water-soluble vitamins and coenzyme medicines. Pharmacological characteristics of lipid-soluble vitamins. Pharmacological characteristics of enzymes drugs. Enzyme medicines as agents for replacement therapy for diseases of the digestive system. Enzyme medicines that are used locally for necrotic process, with scars and spikes. Pharmacological characteristics of enzyme systemic therapy. Complications of enzyme therapy. Anti-enzyme medicines. Inhibitors of proteolysis. Pharmacological characteristics of aminoacids, biogenic stimulants, reparants, medicines for parenteral nutrition, plasma substitutes, desintoxicative solutions. Pharmacological characteristics of medicines, which are used to correct acid-base status and ion balance in the body: alkali, acids, dextrose, medicines containing calcium, potassium, iron, cobalt, iodine, phosphorus, fluorine, magnesium. Classification and pharmacological characteristics of antioxidants and antihypoxants. Medicins that affect the metabolism of bone and cartilage tissues. Pharmacological characteristics of chondroprotectors.

Topic 23. Drugs that affect blood coagulative system

Modern ideas about ways of pharmacological effect on hemostasis. Classification, pharmacological characteristics of drugs that affect the processes of blood clotting (direct and indirect anticoagulants). Comparison of anticoagulants of direct and indirect actions, low molecule heparin and heparin with sulodexid. The logical relationship between side effects and contraindications of anticoagulants.

The common definition of "fibrinolytics", "antiaggregants", "hemostatics", their classification, nomenclature and sources. Pharmacological characteristics of fibrinolytics, antiaggregants, hemostatics. Peculiarities of plant origin hemostatics use. Terms of rational use of drugs affecting hemostasis.

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

Classification and pharmacological characteristics of medicines that regulate hematopoiesis. Stimulators and inhibitors of erythropoiesis. Classification and pharmacological characteristics of iron medicines. Comparison of two- and trivalent iron. Pharmaceutical peculiarities of modern iron drugs. Interaction between iron medicines with drugs from the other pharmacological groups. Conditions for effective and safe use of iron medicines. Classification and pharmacological characteristics of stimulators and inhibitors of leucopoiesis. Their use in oncology.

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

The general concept of medicines containing hormones. Sources of hormones, their dosing, types of

hormone therapy. Terms of rational use of hormonal drugs. Classification and pharmacological characteristics of hormones of the hypothalamus, pituitary, epiphysis. Classification of thyroid and parathyroid glands hormones and their pharmacological characteristics. The concept of antihormonal drugs and their pharmacological characteristics.

Classification of insulin in origin and duration. Pharmacological characteristics of insulin. Pharmacokinetic profile of insulin and their dosage. New medicinal forms of insulin. Side effects in prolonged administration of insulin. First aid for hyperglycemic and hypoglycemic coma.

Classification and pharmacological characteristics of synthetic oral antidiabetic drugs. The requirements imposed on them. Principles of combined administration of antidiabetic drugs from different groups. Correctors of diabetic complications.

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

Classification of corticosteroids depending on their origin, chemical structure, route of administration or type of pharmacological action. The pharmacological characteristics of drugs of adrenal cortex: mineralocorticoids, glucocorticoids and their synthetic analogues. The logical relationship between the pharmacological effects of glucocorticoids, their indications, side effects and contraindications. Comparison of natural and synthetic glucocorticoids (pharmacokinetic and pharmacodynamic differences), especially drugs containing fluoride. Peculiarities of glucocorticoids dosing, depending on the type of drug therapy (substitutive or pathogenetic). The mechanism of withdrawal syndrome development in case of hormonal drugs administration. Peculiarities of new medicinal forms and conditions of rational use of drugs for topical application.

Classification of estrogen and progestin drugs in their origin and chemical structure and pharmacological characteristics. The concept of contraception (hormonal and non-hormonal). The role of the pharmacist in the application of modern contraceptive technology, practice of family planning, prevention of abortion and reproductive health of women. Classification and pharmacological characteristics of modern hormonal contraceptives. Modern medicinal forms of hormonal contraceptives (subcutaneous implants, depot medicines, plasters) and their uses. Combined oral contraceptives, their comparative characteristics depending on the dose of estrogen and progestin components. Combined oral estrogen-progestin medicines that have antiandrogenic properties, pec uliarities of their administration. Medical aspects of hormonal contraceptives administration. Side effects and contraindications. Nonhormonal contraceptives, their mechanism of action. Pharmacological characteristics of male contraception. Anti-estrogenic and antigestagenic drugs: mechanism of action, pharmacodynamics, indications. Pharmacological characteristics of androgenic drugs, anabolic steroids. Peculiarities of main actions and indications of anti-androgens.

Submodule 6. **Chemotherapeutic drugs**

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

Classification and mechanisms of cytostatic action of general groups of antiblastomics. Pharmacological characteristics of antiblastomic drugs. Types of side effects of antiblastomic drugs and measures to prevent them. Pharmacological correctors of complications of chemotherapy. Principles of combined use of antiblastomic drugs from different groups. Pharmaceutical peculiarities of work with cytostatics.

Classification, pharmacological characteristics of radioprotectors and peculiarities of their use in oncology in case of treatment and prevention of radiation sickness.

Classification of medical intoxycations. The concept of antidotes and their classification. Pharmacological characteristics of antidotes. Methods of active detoxication. Peculiarities of vomiting, laxatives, inducers of microsomal oxidation, adsorbents, hepatoprotectors, plasma substitutes and detoxicants in acute poisoning administration. Forced diuresis.

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

Classification and pharmacological characteristics of sulfonamides. The spectrum of action and

dosing regimen sulfonamides. Pharmacological characteristics of quinolone antibiotics and fluoroquinolones, terms of rational use. Classification and pharmacological characteristics of hinoxalin, nitrofurans and 8-oxyhinolin derivatives, the spectrum of antimicrobial activity, features of intestinal and kidney infections. Classification and pharmacological characteristics of antituberculous medicines. Principles of rational use of antituberculous medicines with prolonged use.

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

Classification of antibiotics in chemical structure and mechanism of action. Types and antimicrobial spectrum of antibiotics. Mechanisms of antibiotic resistance development and its possible pharmacological overcome. The term "superinfection", "postantibiotic effect." Beta-lactam antibiotics: penicillins, cephalosporins, monobactams, carbapenems. The classification according to chemical structure, spectrum of antimicrobial action and generations, pharmacological characteristics and features of the combined drugs use. Pharmacological characteristics, antimicrobial spectrum of macrolides, tetracyclines.

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

Pharmacological characterization of aminoglycosides, glycopeptides and lincosamides. Terms of rational application. Pharmacological characteristics, antimicrobial spectrum of chloramphenicol, rifamycin, terms of rational use. Polymyxins. Classification of their spectrum of action and pharmacological characteristics, possible complications and their prevention. The concept of dysbiosis, pre-and probiotics. Principles of effective and safe use of antibiotics, pre-and probiotics.

Topic 31. Antiviral, antifungal and antihelminthic drugs

The main stages of virus replication and possible interference of antiviral drugs in the process of virus replication. Pharmacological characteristics of antiviral drugs. Features of antiviral drugs in pregnant women and patients of different age groups. Pharmacological characteristics of antiherpethetical drugs, peculiarities of their application. Tools for the treatment and prevention of AIDS (ARVs): classification by mechanism of action, pharmacological characteristics. Interferons and interferon synthesis inducers, classification, pharmacological characteristics, indications for use.

Classification of antifungal drugs in chemical structure, route of administration and forms of mycoses infection, the type and the range of antymycose action. Antifungal antibiotics. Pharmacological characteristics of antifungal drugs. Terms of rational use. Pharmacological aspects of the combined use of glucocorticoides, antihistamines, anti-bacterial drugs. Anthelmintic drugs. Classification by origin and according to the classes of worms. Modern requirements to anthelmintic agents. Pharmacological characteristics of medicines used in intestinal nematodoses, cestodoses, trematodoses and those drugs, used in extraintestinal forms of helminthiasis. Terms of rational use.

Topic 32. Antiprotozoal and antispirochetal drugs. Antiseptics and disinfectants

Classification, pharmacological characteristics of antiprotozoal and antispirochetal drugs, terms of rational use. The concept about asepsis, antisepsis, disinfection and their peculiarities in the pharmaceutical practice. The difference between antiseptics and disinfectants. Modern requirements to antiseptics and disinfectants. Basic mechanisms of antimicrobial and antiparasitic action antiseptics and disinfectants. Pharmacological characteristics of products containing halogens, oxidants, acids and alkalis, dyes, ethyl alcohol, detergents, heavy metals, phenols, tar and antibacterial agents of plant origin. Conditions of effective and safe use of antiseptics and disinfectants.

The final test of modul 2

Examination

6. Topics of lectures

№	Name of topic	The amount in hours	
		full time study	part time study
1	General pharmacology. Kinds of action and routes of administration of drugs. The mechanisms of action, kinds of action of drugs. Side effects of drugs	1	
2	General pharmacology. Pharmacokinetics. Classification and principles of the drug dosing. The phenomena that occur during the repeated and combined administration of drugs	1	
3	Drugs affecting the afferent innervation	1	
4	Medicines affecting efferent innervation: pharmacological description of cholinergic agonists	1	
5	Medicines affecting efferent innervation: pharmacological description of cholinergic antagonists	1	
6	Medicines affecting efferent innervation: pharmacological description of adrenergic agonists	1	
7	Medicines affecting efferent innervation: pharmacological description of adrenergic antagonists	1	
8	Pharmacological correctors of allergy	1	
9	Pharmacological correctors of inflammation	1	
10	Pharmacological correctors of pain	1	
11	Psychotropic drugs with inhibitory action	1	
12	Neurotropic drugs with inhibitory action	1	
13	Pharmacological description of CNS stimulants (1 part).	1	
14	Pharmacological description of CNS stimulants (2 part).	1	
15	Medicines affecting GIT (1 part)	1	
16	Medicines affecting GIT (2 part)	1	
17	Cardiotonic and anti-arrhythmic agents	1	
18	Anti-anginal drugs	1	
19	Pharmacology of antihypertensive drugs (1 part)	1	
20	Pharmacology of antihypertensive drugs (2 part)	1	
21	Modern dugs that affect the function of the urinary-genital system. Antigouts	1	
22	Drugs that affect blood coagulative system	1	
23	Drugs that affect blood formation	1	
24	Modern drugs with activity of hormones of the hypothalamus, pituitary, epiphysis, thyroid, parathyroid gland	1	
25	Insulins. Synthetic hypoglycemic drugs	1	
26	Drugs with activity of adrenal gland hormones	1	
27	Drugs with activity of gonads. Anabolic steroids. Contraceptives	1	
28	Pharmacological characteristic of synthetic antibacterial drugs. Sulfonamides. Fluoroquinolones. Antituberculous medicines	1	
29	Modern antibiotics: beta-lactams, macrolides, tetracyclines	1	
30	Antibiotics of different groups: aminoglycosides, glycopeptides, lincosamides, polymyxins, chloramphenicols, rifamycins etc	1	
31	Antiviral drugs	1	

32	Antifungal and antihelminthic drugs	1	
	The whole amount of hours	**32**	

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	Rules of prescribing of solid and soft medicinal forms	3	
2	Rules of prescribing of liquid medicinal forms	3	
3	General pharmacology. Kinds of action and routes of administration of drugs. The mechanisms of action, pharmacodynamics of drugs. Side effects of drugs.	3	
4	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	3	
5	**Control of content module 1.**	3	
6	Drugs affecting the afferent innervation	3	
7	Medicines affecting efferent innervation: pharmacological description of cholinergic agonists	3	
8	Medicines affecting efferent innervation: pharmacological description of cholinergic antagonists	3	
9	Medicines affecting efferent innervation: pharmacological description of adrenergic agonists and antagonists	3	
10	Pain correctors. Pharmacological description of narcotic (opioid) analgesics and non-narcotic analgesics (analgesics-antipyretics). Spasmoanalgesics. NSAID	3	
11	Pharmacological description of anti-allergic agents: blockers of H_1-histamine receptors, membrane stabilizers, blockers of serotonin receptors, selective antagonists of leukotriene receptors	3	
12	**Control of content module 2**	3	
13	Psychotropic drugs of depressant effect. Antipsychotic drugs. Anxiolytics. Sedatives. Hypnotics.	3	
14	Neurotropic drugs of depressant effect. Anticonvulsants. Antiepileptic drugs. Antiparkinsonian drugs	3	
15	Pharmacological description of CNS stimulants	3	
16	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	3	
17	Drugs that affect the function of the gastrointestinal tract. Hepatoprotectors, choleretic and cholelytics, laxative drugs. Enzyme and anti-enzymatic drugs	3	
18	**Control of content module 3**	3	
19	Drugs that affect the functions of the respiratory system. Decongestants, anti-tussive drugs, broncholytics, expectorants,	4	

	mucolytics, surfactants, bronchodilators		
20	Cardiac glycosides and nonglycosides cardiotonics, antiarrhythmic drugs	2	
21	Anti-anginal drugs: nitrovasodilators, blockers of calcium channels, β-adrenoblockers, cardioprotectors, antiatherosclerotic drugs	4	
22	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	4	
23	Diuretics. Antigouty drugs	2	
24	**Control of content module 4**	4	
25	Vitamins and vitamin-like drugs	4	
26	Drugs that affect blood coagulative system. Direct-acting and indirect-acting anticoagulants. Antiaggregants. Activators and inhibitors of fibrinolysis. Hemostatics.	2	
27	Regulators of erythropoiesis. Pharmacology of iron containig drugs	2	
28	Drugs with the activity of hormones of the hypothalamus, pituitary, pineal, thyroid, parathyroid glands. Insulins. Synthetic hypoglycemic drugs	4	
29	Hormonal drugs of adrenal gland cortex and gonads. Contraceptives	4	
30	**Control of content module 5**	4	
31	Sulfonamides. Fluoroquinolones. Antituberculous medicines	4	
32	Antibiotics: penicillins, cephalosporins, carbapenems, monobactams, macrolides, tetracyclines	4	
33	Antibiotics of different groups: glycopeptides, aminoglycoside, lincosamides, phosphomycines, fusidines, polymyxines, chloram-phenicols, rifamycines	4	
34	Antifungal, antihelminthic, antiviral drugs	4	
35	**Control of content module 6**	4	
	The whole amount of hours	**114**	

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 and seminars - theoretical preparation	88	
2	Independent working topics	44,5	
2.1	New medicinal forms and delivery systems of drugs and their impact on the effectiveness of medicines	6	
2.2	Specific side effects of medicines	6	
2.3	Pharmacological characteristics of stimulants afferent nerves, irritatings, bitters, expectorants, emetics; products containing bee and snake venom	8	
2.4	Ethyl alcohol. Pharmacological and toxicological aspects of drug	6	

	addiction and toxicomania		
2.5	The pharmacological characteristics of cerebral blood flow disorders correctors	4	
2.6	Medicines affecting metabolism: vitamins, medicines for the treatment of osteoporosis	2	
2.7	Medicines for parenteral nutrition, plasma substitutes, detoxifiers, drugs affecting the blood system	2	
2.8	Antiblastomic drugs. The poisoning of drugs. Antidotes. Radioprotectors	6	
2.9	Antiseptics and disinfectants	1,5	
2.10	Antiprotozoal and antispirochetal drugs	2	
3	**Semester exam**	22,5	
	The whole amount of hours	**154**	

Tasks for Self-study work

1. Familiarize yourself with the basics of medical prescription. Learn the rules of prescribing solid, soft and liquid medicinal forms.
2. Prepare an abstract on the topic "The latest dosage forms and delivery systems of medicinal substances and their influence on the effectiveness of medicinal products."
3. To analyze the main types of side effects of drugs. Assess the severity of specific side effects of various pharmacological groups of drugs.
4. To classify and guess the pharmacological characteristics of drugs affecting afferent innervation.
5. To characterize medicinal preparations containing bees and snakes.
6. Prepare an essay on the topic "Social significance and pharmacological aspects of drug addiction."
7. Prepare an essay on the topic "Ethyl alcohol. Directions of application in medicine and pharmacology".
8. Prepare a report on the topic "Pharmacological features of hypertensive drugs."
9. Prepare an essay on the topic "Classification, nomenclature and pharmacological characteristics of erectile dysfunction correctors."
10. Classify and provide pharmacological characteristics of enzyme drugs.
11. Classify and provide pharmacological characteristics of drugs for the treatment of osteoporosis.
12. Classify and provide pharmacological characteristics of drugs for parenteral nutrition, plasma exchange agents, detoxifiers.
13. Analyze the types of drug poisoning. Define the concept of antidotes and radioprotectors.
14. Classify and provide pharmacological characteristics of modern antiblastomic drugs.
15. Conduct a comparative analysis of pharmacodynamics and indications for the use of different groups of antiseptics and disinfectants.
16. Prepare an essay on the topic "Antiprotozoal and antispirochete drugs."

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						Content modul 3						
T1	T2	T3	T4	CCM1	T5	T6	T7	T8	T9-10	CCM2	T 11	T 12	T 13	T 14	T 15	CCM3	100
5	5	5	5	10	5	5	5	5	5	10	5	5	5	5	5	10	

Current testing and independent work													sum
Content modul 4						Content modul 5		Content modul 6					
T 16	T 17	T18	T 19	T20 T21	CCM4	T 22-26	CCM5	T27 T28	T 29	T 30	T31- T32	CCM6	100
5	5	5	5	5	10	5 × 5	10	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 (***14-15 tests***).
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 (***12-13 tests***).
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 (***11-12 tests***).
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 (***10-11 tests***).
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 (***9-10 tests***).
0-2	The applocant 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 (***0-8 tests***).

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.
12. Textbooks
13. Educational and methodological workshops, manuals, atlases, recommendations
14. Workbooks
15. Video educational materials (educational films, recordings of experiments).

14. Reading suggestions

The main reading suggestions

1. Pharmacology-Cito! Textbook / Edited dy 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 spesial pharmacology (part I) / S.M. Drogovoz, T.A. Kutsenko. – Kharkiv: NPhaU, 2009. – 72 p.
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.
5. Pharmacology : manual for practice on spesial pharmacology (part I) / S.M. Drogovoz, T.A. Kutsenko. – Kharkiv: NPhaU, 2012. – 68 p.
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.
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

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., Panasenko 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. Ukranian 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; E-mail: pharmacolpharmacother@nuph.edu.ua