Ministry of Healthcare of Ukraine
Poltava State Medical University

Department of pharmacology

SYLLABUS

PHARMACOLOGY

normative

(normative / selective discipline)

academic and professional level	the second (master's) level of higher education
field of knowledge	22 «Healthcare»
specialty	221 «Dentistry»
academic qualification	Master of Dentistry
professional qualification	Dentist
academic and professional program	«Dentistry»
mode of study	daily
course(s) and semester(s) of study of the discipline	2-3 course 4-5 semesters

Poltava – 2024

INFORMATION ABOUT LECTURERS WHO DELIVER THE ACADEMIC DISCIPLINE

Surname, name, patronymic of the lecturer (lecturers), scientific degree, academic title	Vazhnichaya Olena Mitrofanivna, Doctor of Medical Sciences, Professor Kapustnik Yuri Oleksiyovich, PhD, Associate Professor
Profile of lecturers	https://pharmacology.pdmu.edu.ua/team
Contact phone	(0532) 56-20-59
E-mail:	pharmacology@pdmu.edu.ua
Department page at the website of PSMU	https://pharmacology.pdmu.edu.ua/

MAIN CHARACTERISTICS OF THE ACADEMIC DISCIPLINE

The scope of the academic discipline

The number of credits / hours 6,0 / 180 of which:

Lectures (hours) **24**

Seminar classes (hours.) **72**

Self-directed work (hours). **84**

Type of control – exam

The policy of the academic discipline

The Department of pharmacology in studying the discipline adheres to the requirements, which are spelled out in the regulations on academic integrity of higher education seekers and employees of the Poltava State Medical University.

General requirements for higher education seekers include: attending classes (inadmissibility of absences, delays); rules of conduct in pharmacology classes (active participation in the topic, culture of behavior). Besides, they include rules of preparing for practical classes (writing medical prescriptions in a notebook, pharmacological characteristics of drugs according to the list of integrated licensing exam «Step 1», solving test tasks on the topic of the lesson).

The policy of the department is based on the norms of the legislation of Ukraine "On Education", "On Higher Education", the Charter of Poltava State Medical University and the following provisions:

Regulation on the organization of the educational process in Poltava State Medical University.

Internal code of conduct for students of Poltava State Medical University.

Regulation on the organization and methods for assessment of educational activities of higher education recipients at Poltava State Medical University.

Regulation on the organization of self-directed work of students at Poltava State Medical University.

The abovementioned regulations can be founded in detail at the link https://www.pdmu.edu.ua/n-process/department-npr/normativni-dokumenti

Description of the academic discipline (summary)

«Pharmacology» is a theoretical discipline, in the study of which students acquire the basic knowledge of the pharmacological groups of drugs, classifications of drugs, pharmacokinetics, pharmacological effects, mechanisms of action, indications and contraindications to the use of drugs, side effects of drugs and interactions between drugs in complex treatment regimens. The study of the discipline «Pharmacology» provides for the acquisition by each student knowledge about medicines in general, the ability to use the acquired knowledge in the further studying of other sciences of practical medicine and in the practice of a doctor. The study of pediatric pharmacology involves the deduction of doses of drugs for children of different ages and the particular effects of pharmacological drugs on the children's body.

Due to the constant changes in the assortment of drugs on the global pharmaceutical market, new groups of drugs have been added to the program in accordance with the anatomical and chemical

therapeutic - ATC classification of the latest revision (Anatomical Therapeutic Chemical classification system, WHO, 2016). The assimilation of theoretical material is accompanied by the acquisition of appropriate integral, general and professional competencies.

The working curriculum of the discipline consists of 2 modules, which include 8 content modules.

The subject of the study of the discipline is the theoretical foundations of pharmacodynamics, pharmacokinetics and the use of drugs for treatment and for prophylactic purposes in children. The study of the «organism-drug» system in interaction with the environment is the methodological basis of modern pharmacology.

Pre-requisites and post-requisites of the academic discipline (interdisciplinary links)

Pre-requisites.

The studying of pharmacology is based on the knowledge, that students got at the study of different subjects. They include Latin, language and medical terminology, philosophy, anatomy of human, medical biology, medical chemistry, biological and bioorganic chemistry, medical and biological physics, physiology, microbiology, virology and immunology, pathomorphology, physiopathology, propaedeutic of internal medicine, propaedeutic of therapeutic stomatology, propaedeutic of orthopedic stomatology, propaedeutic of pediatric therapeutic stomatology. The student must be able to integrate these disciplines with pharmacology.

Pharmacology has the foundations due to studying by students numerous clinical disciplines. Students form abilities to apply of knowledge from pharmacology in the process of further study of all clinical disciplines. These disciplines include internal medicine, infectious diseases and epidemiology, clinical pharmacology, surgery, including oncology and neurosurgery, general medical training, ophthalmology, neurology, including neurostomatology, dermatology, venereology, psychiatry, narcology. Besides, sstudents must use knowledge in medical psychology, physical rehabilitation, sports medicine, endocrinology), otolaryngology, obstetrics, emergency and urgent medical care, social medicine, public health and bases of evidence-based medicine, prevention of stomatological diseases, therapeutic stomatology, surgical stomatology, orthopedic stomatology, orthodontics, pediatric therapeutic and surgical dentistry) and in future professional activity.

The purpose and tasks of the academic discipline:

The purpose of studying the academic discipline is acquisition by every getter of higher education of theoretical knowledge and practical skills in relation to main principles based on rational and safe for human’s health administration of medicinal agents with the purpose of treatment and prevention of diseases.

The main tasks of studying the discipline are granting for getters of higher education of theoretical knowledge concerning determination of group belonging of drug, their pharmacokinetics, pharmacodynamics, manifestation of possible adverse reactions, symptoms of overdose, measures that prevent an occurrence, tactic of elimination of adverse reactions. Besides, they include main indications for administration and interaction with other drugs and acquisition of practical skills, in particular writing of prescriptions for drugs in different medical forms.

Competences and studying results in accordance with the academic and professional program. The formation of these programs was facilitated by use different discipline (integral, general, special)

- integral:

ability to solve complex tasks and problems in the field of health care in the specialty «Dentistry» in professional activities or in the process of study, which involves research and / or innovation and is characterized by uncertainty of conditions and requirements.

- general:

1. Ability to think abstractly, analyze and synthesize.

2. Knowledge and understanding of the subject area and understanding of professional activities.

3. Ability to apply knowledge in practical activities.

4. Skills in the use of information and communication technologies.

5. Ability to search, process and analyze information from various sources.

- special (professional, subject):

1. Ability to collect medical information about the patient and analyze clinical data.

2. Ability to interpret the results of laboratory and instrumental studies.

3. Ability to design the process of providing medical care: to determine the approaches, plan, types and principles of treatment of diseases of organs and tissues of the oral cavity and maxillofacial region.

4. Ability to maintain regulatory medical records.

5. Processing of state, social and medical information.

Programmatic results of studies, forming of that is assisted by discipline:

1. To know and understand basic and clinical biomedical sciences at a level sufficient to solve problems in the field of health care in the specialty "Dentistry" in professional activity or in the process of study.

2. Determine the approach, plan, type and principle of treatment of dental disease by making an informed decision according to existing algorithms and standard schemes.

3. Determine the nature of the work, rest and necessary diet in the treatment of dental diseases based on a preliminary or final clinical diagnosis by making an informed decision based on existing algorithms and standard schemes.

4. Determine the tactics of managing a dental patient with somatic pathology by making an informed decision according to existing algorithms and standard schemes.

5. To carry out treatment of major dental diseases according to existing algorithms and standard schemes under the supervision of a supervising physician in a health care facility.

6. Analyze and evaluate government, social and medical information using standard approaches and computer information technology.

7. Formulate goals and determine the structure of personal activities based on the results of the analysis of certain social and personal needs.

8. To realize and be guided in their activities by civil rights, freedoms and responsibilities, to improve the general educational cultural level.

9. To comply with the requirements of ethics, bioethics and deontology in their professional activities.

10. To organize the necessary level of individual safety (own and persons under his/her care) in case of typical dangerous situations in the individual field of activity.

11. Perform medical manipulations on the basis of preliminary and/or final clinical diagnosis for different segments of the population and in different conditions.

Learning outcomes of the academic discipline:

Students must know after completing their study in the academic discipline:

1. Basic ways of pharmacological correction of stomatological and somatic diseases, pathological functions of organs and systems.

2. Nomenclature and classifications of medicinal agents.

3. Pharmacological description of the fixed medicinal assets: group belonging of medicinal agents, features of pharmacokinetics, their mechanism of action, pharmacological effects (main, side), indication and contra-indications to administration.

4. Manifestations of possible side effects of drugs, symptoms of overdose of potent and toxic drugs, methods of their prevention and principles of treatment.

5. Rules for prescribing drugs in various dosage forms in accordance with modern legislation of Ukraine.

To be able:

1. To write prescriptions on medicinal preparations in different medical forms in accordance with the modern legislation of Ukraine.

2. To determine group belonging of medicinal facilities in obedience to modern classifications.

3. To expect the dose of medical drug.

4. To determine, depending on the pharmacokinetics of drugs, the frequency of drug administration, its daily, course dose in patients of different ages in accordance with concomitant somatic pathologies and the use of other drugs.

5. Justify the adequate dosage form and routes of administration of drugs.

6. Predict the consequences of drug interactions in their combined administration.

7. Evaluate the benefit / risk ratio when using drugs.

8. To determine the manifestations of possible side effects of drugs, symptoms of overdose of potent and poisonous drugs, methods of their prevention and principles of treatment.

9. To determine the principles of pharmacotherapy of dental disease by making an informed decision according to existing algorithms and standard schemes.

10. Provide a comparative description of drugs in terms of efficacy, safety, mechanism of action, indications for use, etc.

11. Create an algorithm to help patients with acute drug poisoning using antidotes in each case.

12. Determine the possibilities of using medicines in emergency care, martial law, lack of information and limited time.

13. Pharmacotherapy of major emergencies.

14. Conduct analysis of pharmacological and medical information using standard approaches and computer information technology.

Thematic plan of lectures (by modules), specifying the basic issues, which are considered at the lecture

Seq. №	Title of the topic	Number of hours
1	**History of pharmacology development. The state of modern pharmacology. The Law of Ukraine "On Medicines". General pharmacology.** Summarize knowledge about the place of pharmacology among other sciences and the contribution of domestic and foreign scientists to its development. To acquaint with the ways of drug administration, mechanisms of their absorption, transportation through membranes, barriers, distribution in the body. Summarize the differences in the conversion of drugs in the body and the mechanisms of their excrition from the body. To interpret the relationship of the pharmacokinetics of drugs with their pharmacological effects. Knowledge of the place of pharmacology among other sciences and the contribution of domestic and foreign scientists to its development (Cherkes A.I., Anichkov S.V., Trinus F.P., Komissarov I.V.). An idea of the general mechanisms of action of drugs, mediators, principles of pharmacological classification. To generalize the difference between the types of action of drugs, the types of interaction of drugs with receptors. To interpret the relationship between the elements of the chemical structure of drugs and the types of mediators. To interpret the relationship between the features of the mechanisms of action of drugs with their pharmacological effects.	2
2	**Pharmacology of drugs that affect the afferent nervous system.** Substances that affect the transmission of impulses in the region of the end of the afferent nerves. Classification, mechanism of action, comparative characteristics of local anesthetics, astringents, covering and adsorbing agents. Toxic and allergic	2

	effects of anesthetics. Requirements for drugs of a group of local anesthetics. The purpose and possibilities of combination with adrenergic agonists. Side effects of local anesthetics, measures for its prevention and treatment.	
3	**Pharmacology of drugs that affect the transmission of excitation in cholinergic synapses.** Modern ideas about the structure of the sympathetic and parasympathetic departments of the autonomic nervous system, the pharmacological regulation of their functions, with pharmacokinetics, pharmacodynamics, mechanisms of action and the use of cholinomimetics and anticholinergics. Side effects of cholinergic drugs, the state of poisoning organophosphorus compounds, belladonna alkaloids and help with this.	2
4	**Pharmacology of drugs that affect the transmission of excitation in adrenergic synapses.** The current understanding of the structure of the attractive part of the autonomic nervous system, the pharmacological regulation of its function in pharmacokinetics, pharmacodynamics, mechanisms of action of adrenomimetic drugs. Pharmacokinetics, pharmacodynamics, mechanisms of action, use and side effects of antiadrenergic agents.	2
5	**Pharmacology of drugs that affect the central nervous system. Analgesic drugs.** Characterization of pain and anti-nociceptive system. Concept of opiate receptors. Classification and pharmacology of narcotic analgesics. Neuroleptanalgesia. Poisoning with narcotic analgesics, help in case of its development, and antidotes. Addiction. Classification of non-opiate analgesics by chemical structure. General characteristics of the group. Mechanisms of action and side effects of non-opiate analgesics, ways of prevention.	2
6	**Psychotropic drugs. Neuroleptics. Tranquilizers. Sedatives.** Classifications and pharmacological characteristics of neuroleptics, tranquilizers and sedatives. Combined use. Hypnotics. The main types of insomnia. Classification of hypnotics according to chemical structure and their general characteristics. Normotimics. Poisoning of neuroleptics, tranquilizers, sedatives, sleeping pills and lithium salts, help with this. Addiction.	2
7	**Psychomotor stimulants, antidepressants, nootropic drugs, adaptogens. Analeptics.** Classifications and pharmacological characteristics of psychotropic stimulants, antidepressants, nootropic drugs, adaptogens, analeptics. Indications for use. Side effects of antidepressants. Concept of psychodysleptics and amphetamines. Formation of dependence, social significance. Medicines leading to addiction, drug and substance abuse.	2
8	**Medicines affecting the cardiovascular system. Medicines for the treatment of coronary heart disease. Antihypertensive drugs.** Classification, mechanism of action, pharmacology of cardiotonic drugs. Symptoms of poisoning by cardiac glycosides, emergency care in this poisoning. The mechanism of action and pharmacology of antiarrhythmic drugs. Mechanism Antiarrhythmic actions of potassium preparations. Medicines for the correction of bradycardia. Classification, mechanism of action and pharmacology of antihypertensive drugs	2
9	**Pharmacology of drugs that affect the blood system: coagulants, anticoagulants, fibrinolytic drugs, fibrinolysis inhibitors, antiplatelet agents.** Classification of drugs that affect hemostasis. Medicines that affect blood coagulation, fibrinolysis on platelet aggregation. Classification of agents used for the prevention and treatment of bleeding. Classification of coagulants.	

	Pharmacokinetics, pharmacodynamics. Indications for use. Pharmacology of hemostatic agents of other groups. Classification of agents used for the prevention and treatment of thrombosis. Classification of anticoagulants. Pharmacokinetics, pharmacodynamics Indications for use. Side effect of indirect anticoagulants. General characteristics of fibrinolytic agents. Indications for use. Side effects. General characteristics and mechanisms of action of agents that reduce platelet aggregation.	
10	**Antiseptics and disinfectants.** Pharmacology of antiseptic and disinfectants of an inorganic nature. Classification, mechanisms of action and pharmacology of these antiseptics and disinfectants, complications after their use, help in case of their overdosing. Pharmacology of antiseptic and disinfectants of organic nature. Classification, mechanisms of action and pharmacology of these antiseptics and disinfectants, complications after their use, emergency care in their overdosing.	
11	**Pharmacology of antibiotics.** The history of the discovery and introduction of antibiotics in medical practice. Classification of antibiotics by chemical structure, spectrum and mechanism of action. The penicillin group and the cephalosporin group. Classification of the spectrum of action, mechanism of action and main indications for the use of antibiotics, which are inhibitors of bacterial wall synthesis. The classification is the spectrum of action, the mechanism of action and the main indications for the use of antibiotics, which are inhibitors of ribosomal subunits and violating the structure of the membrane. The principles of rational combination of drugs. Side effects of antibiotics and methods for its prevention.	2
12	**Basic principles of treatment of acute drug poisoning. Antidotes.** The basic principles of pharmacotherapy of acute drug poisoning. Types of poisons, clinical signs of poisoning, pharmacological characteristics of antidotes, pharmacological preparations for symptomatic therapy.	2
Total		**24**

Thematic plan of content modules, specifying the basic issues, which are considered at the seminar class

Seq. №	Title of the topic	Number of hours
Content module I. *Medical prescription. General pharmacology.*		
1	**A medical prescription and the rules for prescribing it. Rules for prescribing dosage forms.** The concept of medical prescription, medicinal raw materials, substance, agent, form, preparation. Prescription: structure and rules for writing prescriptions for adults and children, types of prescription forms. Pharmacy. Definition of pharmacopeia, types of pharmacopeia. Principles for calculating prescriptions. Concept of trunk and official medicines. Methods for prescribing dosage forms. The choice of dosage forms for specific clinical situations. Solid dosage forms (powders, tablets, capsules, cachets, glosses, lozenges, caramels, dragees, microdargets, spansulas, granules, powders, tooth powders, species, mustards and pencils). Features of prescribing of medicines and its use in dentistry. Liquid dosage forms (solutions and drops for oral administration, infusions, decoctions, mixtures, suspensions, emulsions, mucus, syrups, tinctures, liquid extracts, novogalenic drugs, patented solutions, solutions for external use, eye	2

	drops, ear drops, nasal drops). Aerosols. Rules for prescribing liquid dosage forms. Features of application in dentistry. Solutions for injection. Requirements for injection solutions, rules for writing of prescriptions; route of administration. Methods of sterilization of injection solutions.	
2	**Rules for prescribing non-dosed dosage forms.** Solid dosage forms (powders, tooth powders, herbal remedies, mustard and pencils, powders). Liquid dosage forms (solutions for external use, drops for eyes, ears, nose). Features of application in dentistry. Soft dosage forms (ointments, liniments, pastes, dental pastes, toothpastes). Requirements for soft dosage forms, rules for prescribing. Constituents for soft dosage forms. Rules for prescribing dental pastes.	2
3	**Control of practical skills in medical prescription.** Written prescriptions for all dosage forms. Filling in the prescription form. Registration of the prescription. Prescribing medicines in various dosage forms. Peculiarities of prescribing dosage forms used in dentistry. Selection of dosage forms for specific clinical situations.	2
4	**General pharmacology. Pharmacokinetics of drugs. Control of practical skills in the ability to use modern reference books on medicines.** Definition of pharmacology. The development of knowledge and the history of pharmacology. The role of domestic and foreign scientists in the formation and development of pharmacology as a science (Petrovsky, Kravkov, Cherces, Victorov, Stefanov). Modern development of pharmacology in Ukraine. The main achievements of domestic pharmacologists. The main provisions of the pharmacokinetics of drugs.	2
5	**General pharmacology. Pharmacodynamics of drugs. Principles of drug classification.** The main provisions of the pharmacodynamics of drugs. Features of the action of drugs during their repeated use. Side effects of drugs. Basic principles and types of drug interactions. The concept of drug safety. Principles of drug classification	2
Content module 2. *Medicines affecting the peripheral nervous system*		
6	**Drugs for local anesthesia.** Classification by chemical structure and by use for various types of anesthesia. Requirements for drugs of a group of local anesthetics. Pharmacology of esters (procaine, benzocaine) and substituted amides (articaine, lidocaine, bupivacaine, mepivacaine). Comparative characteristics of local anesthetics and complex preparations based on them (ultracain DS). Indications for use. The purpose and possibilities of combination with adrenergic agonists. Side effect of local anesthetics, measures for its prevention and treatment.	2
7	**Drugs that act on the transmission of excitation in cholinergic synapses. Cholinomimetics. Anticholinesterase drugs.** Classification of agents affecting the autonomic nervous system. Medicines that affect the function of cholinergic nerves. Concept of cholinergic receptors. Classification of agents affecting the function of cholinergic nerves. Pharmacological effects arising from the excitation and inhibition of cholinergic receptors. Cholinomimetic drugs M- and N- cholinomimetic drugs. Anticholinesterase agents and cholinesterase reactivators. Classification of anticholinesterase drugs. The mechanism of action, pharmacological effects, indications for use, side effects. Comparative characteristics of anticholinesterase drugs (neostigmine methyl sulfate, galantamine hydrobromide, pyridostigmine bromide). Features of the action of organophosphorus compounds. Acute poisoning by organophosphorus compounds and emergency care in this	2

	poisoning. Pharmacology of reactants of organophosphorus compounds (aloxim, dipiroxim). M-cholinomimetics. Pharmacological characteristics of pilocarpine hydrochloride. Effect on the organ of vision, smooth muscles of internal organs, secretion of glands, cardiovascular and genitourinary systems. Indications for use. Acute muscarin poisoning. Relief measures, antidote therapy. H-cholinomimetics (lobelin hydrochloride). Mechanism of action. Pharmacological effects, indications for use, side effects. Pharmacological effects of nicotine. Smoking as a medical and social problem. Medicines that facilitate the withdrawal of smoking cessation. Side effects.	
8	**Drugs that act on the transmission of excitation in cholinergic synapses. M-cholinergic antagonists. H-cholinergic antagonists.** Anticholinergic drugs. M- and N-anticholinergics. M-cholinoliticks drugs. Pharmacological characteristics of atropine sulfate. Indications for use. Acute poisoning with atropine and plants containing alkaloids from M-cholinoliticks properties. Help measures. Comparative characteristics of platifillin hydrotartrate, ipratropium bromide, pirenzepine, butyl bromide hyoscine, tropicamide. Indications for use. Side effects. N-cholinoblockers (ganglion blockers, muscle relaxants). Classification of ganglion blockers (benzohexonium, hygronium, pentamine). Mechanism of action. Pharmacological effects, indications for use, side effects. Classification of muscle relaxants. Pharmacokinetics, pharmacodynamics of tubocurarine chloride. Indications for use, side effects. Comparative characteristics of muscle relaxants (pancuronium bromide, pipecuronium bromide, rocuronium bromide). Clinical symptoms of an overdose and assistance with an overdose of non-depolarizing (curariform) muscle relaxants. The concept of decuralization. Pharmacological characteristics of depolarizing (suxamethonium) muscle relaxants. Indications for use. Emergency care in N-cholinoblockers overdose. Pharmacological properties of pimadine. Central muscle relaxants (tolperisone, baclofen).	2
9	**Drugs that affect the transmission of excitation in adrenergic synapses. Adrenomimetics, sympathomimetics.** Drugs affecting adrenergic innervation. Modern ideas about adrenergic receptors, their types and localization. Classification of agents affecting adrenergic innervation. Sympathomimetic drugs. Pharmacological characteristics of adrenomimetics. Pharmacokinetics, pharmacodynamics of epinephrine hydrochloride. Indications for use. Comparative characteristics of adrenergic agonists (norepinephrine hydrotartrate, ephedrine hydrochloride, phenylephrine, naphazoline, xylometazoline, salbutamol, fenoterol). The mechanism of action and indications for use, side effects.	2
10	**Drugs that affect the transmission of excitation in adrenergic synapses. Antiadrenergic drugs, sympathizers.** Medicines that affect adrenergic innervation. Modern ideas about adrenergic receptors, their types and localization. Classification of agents affecting adrenergic innervation. Antiadrenergic drugs. Adrenergic blocking drugs. Features of the use of α-blockers (prazosin, doxazosin, tamsulosin), mechanism of action and pharmacological effects of β-blockers. Comparative characteristics of propranolol, atenolol, metoprolol, bisoprolol, carvedilol. Sympatholytics (reserpine). The mechanism of action and indications for use, side effects. The concept of dopamine and histaminergic drugs. Serotonin receptor stimulants and blockers.	2
Content module 3. ***Medicines that affect the function of the central nervous system.***		

	Psychotropic drugs.	
11	**Drugs for anesthesia. Anticonvulsants and antiparkinsonian drugs.** Classification by duration of action. Pharmacological and comparative characteristics of propofol, thiopental sodium, hexobarbital, ketamine, sodium oxybate. The concept of sedation, induction, basic, combined anesthesia. Pharmacology and toxicology of ethyl alcohol, use in clinical practice. Acute and chronic alcohol poisoning, relief measures. The principle of treatment of alcoholism. The mechanism of action of disulfiram. Convulsions as symptoms of the manifestation of various pathological conditions. The use of drugs of various pharmacological groups to eliminate seizures (tranquilizers, muscle relaxants, sleeping agents, narcotic drugs, myotropic antispasmodics). Antiepileptic drugs (phenobarbital, diphenin, carbamazepine, clonazepam, midazolam, sodium valproate, lamotrigine, levetiracetam, gabapentin). Classification of antiepileptic drugs according to indications. Comparative characteristics, side effects of antiepileptic drugs. Anti-Parkinsonian drugs (levodopa, selegeline, amantadine, pramipexole, pyribedil, cyclodol). Classification, basic mechanisms of action. Clinical use.	2
12	***Pharmacology of opiate (narcotic) analgesics.*** Analgesic medicines. General characteristics of opiate analgesics (morphine hydrochloride, codeine phosphate, trimeperidine, fentanyl, tramadol, butorphanol, buprenorphine, nalbuphine). Classification. Ways to eliminate pain. Concept of opiate receptors. Narcotic analgesics. Classification by chemical structure, origin and affinity for opiate receptors. Mechanism of action. Pharmacology of morphine hydrochloride. Features of the effect of the drug on the central nervous system. Comparative characteristics of drugs. Indications for the use of analgesic agents. Side effects. Acute poisoning with narcotic analgesic drugs. Clinical manifestations and measures of assistance. Characteristics of nalorphine hydrochloride, naloxone, naltrexone. Drug dependence arising in opiate analgesics, clinical manifestations, the concept of withdrawal symptoms, treatment methods. Addiction as a socio-biological problem.	2
13	**Pharmacology of non-opiate (non-narcotic) analgesics and non-steroidal anti-inflammatory drugs.** Non-opiate analgesics. Classification of non-opiate analgesics by chemical structure. General characteristics of the group. Mechanisms of analgesic, antipyretic effect. Pharmacological and comparative characteristics of the drugs (metamizole sodium, paracetamol, dexketoprofen, nimesulide, diclofenac sodium, acetylsalicylic acid). Side effect of non-opiate analgesics, measures for their prevention. Pharmacology of non-steroidal anti-inflammatory drugs and comparative characteristics of drugs (acetylsalicylic acid, mefenamic acid, ketorolac, indomethacin, diclofenac sodium, ibuprofen, naproxen, dexketoprofen, meloxicam, celecoxib, nimesulide) by the degree of inhibition of COX (cyclooxygenase)-1 and -2 and the severity of anti-inflammatory effect. Side effects of drugs and measures to prevent them.	2
14	**Neuroleptics, tranquilizers, hypnotics, sedatives.** Psychotropic drugs. Classification of psychotropic drugs. General characteristics of antipsychotics, classification by chemical structure. General characteristics. The mechanism of antipsychotic action of neuroleptics. Pharmacological effects of chlorpromazine, chlorprotixen, droperidol, haloperidol, sulpiride, clozapine. Comparative characteristics, indications for use. Side effects of antipsychotics. Combined use with drugs of other pharmacological groups. The concept of neuroleptanalgesia.	

	Tranquilizers. Classification of tranquilizers. The mechanism of tranquilizing action, the concept of benzodiazepine receptors. Pharmacological and comparative characteristics of diazepam, clonazepam, phenazepam. Daytime tranquilizers (gidazepam, medazepam). The concept of atypical tranquilizers (mebicar). Indications and contraindications for the use of tranquilizers, their side effects. Drug addiction. Combined use with drugs of other pharmacological groups. The concept of ataralgesia. Anxiolytics of non-benzodiazepine structure (mebicar, afobazole). Acute poisoning with tranquilizers, relief measures. Benzodiazepine receptor antagonists (flumazenil). Hypnotics. Modern ideas about the nature of sleeping. The main types of insomnia. Classification of hypnotics by chemical structure and their general characteristics. Possible mechanisms of action. Comparative characteristics of hypnotics of various groups (phenobarbital, nitrazepam, doxylamine, zopiclone, zolpidem, zaleplon). Indications for use, side effects (abstinent syndrome, aftereffect action, drug dependence). Acute poisoning with barbiturates, relief measures. Sedatives. Classification and pharmacological characteristics of sedatives (peony tincture, valerian tincture, motherwort tincture, combined preparations).	
15	**Psychomotor stimulants, antidepressants, nootropic drugs, adaptogens. Analeptics.** Psychotropic stimulants. General characteristics of the group of psychostimulants. Pharmacokinetics and pharmacodynamics of sodium caffeine benzoate. Indications for use. Concept of psychodysleptics and amphetamines. Formation of dependence, social significance. Medicines leading to addiction, drug and substance abuse. Classification of antidepressants by the mechanism of action and chemical structure (amitriptyline, maprotiline, fluoxetine, fluvoxamine, desvenlafaxine, pregabalin, mirtazapine). Pharmacology of antidepressants. Side effects of antidepressants. Nootropic drugs. Classification of nootropic drugs. Possible mechanisms of action, indications for use. Pharmacological characteristics and comparisons of piracetam, aminalon, vinpocetine, nicergoline, pentoxifylline, aminophenylbutyric acid, Ginkgo Biloba preparations. Adaptogens. Classification and pharmacological characteristics of adaptogens of plant and animal origin (ginseng tincture, lemongrass tincture, liquid eleutherococcus extract, liquid leuzea extract). Analeptics. Classification of analeptics and pharmacological characteristics of niketamide, sulfocamphocaine, etimizole. Indications for use.	2
	Content module 4. ***Pharmacology of agents affecting function of cardio-vascular system.***	
16	**Cardiotonic drugs. Cardiac glycosides. Antihypertensive drugs.** Classification and general characteristics of agents affecting the cardiovascular system. Cardiotonic drugs. Classification of cardiotonic agents. Pharmacokinetics and pharmacodynamics of cardiac glycosides. Comparative characteristics of strophantin, corglycon, digoxin. Indications and contraindications for use. Side effects of cardiac glycosides. Acute and chronic cardiac glycoside poisoning. Emergancy care and prevention of cardiac glycoside intoxication. Ways of pharmacological correction of high blood pressure. Modern classification of antihypertensive drugs. Pharmacological characteristics of antihypertensive drugs of the main groups. Pharmacology of β-adrenergic blocking agents (propranolol, atenolol, metoprolol, bisoprolol, carvedilol) ACE inhibitors (captopril, enalapril, lisinopril) angiotensin II receptor blockers	2

	(losartan, telmisartan, valsartan) calcium antagonists (nifedipidemide, inmindoformide, amidipidemidin, hydrochlorothiazide, spironolactone). Medicines of an additional group. Pharmacological characteristics of central α2-adrenergic agonists (clonidine, methyldopa), imidazoline receptor agonists (moxonidine), α1-adrenergic blocking agents (prazosin, doxazosin, urapidil), sympatholytics (reserpine), peripheral vasodilators (sodium nitroprusside, magnesium sulfate, and hydralazine). The principles of the combination of antihypertensive drugs. Comparative pharmacological characteristics of these groups, the rate of development of the hypotensive effect. Medicinal care for hypertensive crisis.	
17	**Medicinal products used for the treatment of patients with coronary heart disease (antianginal medicinal products). Hypolipidemic drugs.** Classification and general pharmacological characteristics of antianginal drugs. Pharmacokinetics and pharmacodynamics of nitroglycerin, side effects. Comparative pharmacological characteristics of drugs of the group of organic nitrates (isosorbide dinitrate, isosorbite mononitrate). The mechanism of action of calcium channel blockers (calcium antagonists). Pharmacological characteristics of verapamil, nifedipine, amlodipine, diltiazem. Features of the use of β-blockers in the treatment of patients with coronary heart disease (propranolol, atenolol, metoprolol, bisoprolol, carvedilol, nebivolol), vasodilating agents of myotropic action (dipyridamole, papaverine hydrochloride, drotaverin), reflex type of action (validolol) and menthol solution. Indications and contraindications for use, side effects. The concept of the "stealing" syndrome. Emergency medication for myocardial infarction. General characteristics of the pharmacological groups of drugs, which are useful for treatment atherosclerosis. Hypolipidemic drugs. General pharmacological characteristics of lipid-lowering drugs, the direction of action. Classification of lipid-lowering drugs according to the mechanism of action. Pharmacokinetics and pharmacodynamics of statins (lovastatin, simvastatin, atorvastatin, rosuvastatin). Comparative characteristics of drugs of other groups in the treatment of hyperlipidemia (fibrates), niacin group (nicotinic acid), bile acid sequestrants (cholestyramine). Mechanisms of action. Indications for use and side effects. Angioprotectors.	2
18	**Test control of theoretical training from the KROK-1 base on content modules 1-4.** Test control of theoretical training.	2
Content module 5: Medicinal products that affect the function of the kidneys, respiratory system, digestion and blood system. Antineoplastic drugs.		
19	***Medications for respiratory function.*** Bronchodilator drugs. Classification of bronchodilators. Pharmacology of adrenergic agonists (salbutamol, fenoterol, formoterol, salmeterol), M-cholinoblockers (ipratropium bromide, tiotropium bromide), myotropic bronchodilators (theophylline, aminophylline) combined drugs. Pharmacokinetics, pharmacodynamics, side effects. The use of desensitizing and anti-allergic drugs. General characteristics of topical anti-inflammatory drugs (beclomethasone, fluticasone) combined drugs (seretide) mast cell stabilizers (sodium cromoglycate, nedocromil, ketotifen), leukotriene receptor blockers (montelukast) drugs for systemic use in obstructive diseases of the respiratory tract (monfensocirilid antibodies), drugs (omalizumab), antihistamines and antileukotriene drugs.	2

	Respiratory stimulants. Classification of respiratory stimulants and pharmacological characteristics of niketamide, camphor, sulfocamphocaine, etimizol. Indications for use. Antitussive drugs. Classification of antitussive drugs and general characteristics (codeine phosphate, glaucin, butamirate). Side effect. Expectorant medicines and mucolytics. Classification of expectorants and mucolytics according to the mechanism of action and pharmacological characteristics of the drugs (preparations of marshmallow, thermopsis, crystalline trypsin, mucaltin, acetylcysteine). Side effects. Surfactant synthesis stimulants (bromhexine, ambroxol). General characteristics of drugs. Emergency care for acute respiratory dysfunction (apnea, bronchospasm, pulmonary edema).	
20	**Drugs affecting the function of the digestive system** Medicines using for treatment of diseases of the esophagus, stomach and duodenum: gastroprotectors (bismuth tripotassium dicitrate) H2-receptor blockers (ranitidine, famotidine), proton pump blockers (omeprazole, lansoprazole, dexlansoprazole), selective M1-cholinoblockers (pirenzepine), antacids (almagel, maalox, sodium alginate), drugs used for NSAID gastropathy (misoprostol). Drugs used for functional gastrointestinal disorders (mebeverin, prinobium bromide, butyl bromide hyoscine, simethicone), stimulators of the motor-evacuation function of the upper gastrointestinal tract (domperidone, metoclopramide). General characteristic of antiemetics: H1-receptor blockers (diphenhydramine) 5-HT-3 blockers – receptors (ondasetron, tropisetron) D2-receptor blockers (metoclopramide). Pharmacological characteristics of metoclopramide. Classification of agents that stimulate the excretory function of the pancreas and using for replacement therapy (pancreatin). Indications for use. Characterization of drugs inhibiting the excretory activity of the pancreas (aprotinin, aminocaproic acid). Indications for use. Cholagogue drugs. Classification of choleretic drugs. General characteristics of agents that stimulate the formation of bile (choleretics). The mechanism of action of choleretic drugs containing bile and natural bile acids (ursodeoxycholic acid), plant origin (corn stigmas, rose hips, holosas). Pharmacological characteristics of agents that enhance the outflow of bile – cholekinetics (magnesium sulfate, M-cholinoblockers, antispasmodics myotropic effects). Indications for use. Hepatoprotectors and cholelitolytic drugs. The mechanism of action of agents that stimulate liver function (sulymarin, essential phospholipids, ademethionine, arginine). Indications for use. Laxatives (bisacodyl, sodium picosulfate, lactulose, castor oil). Mechanism of action. Indications for use. Pharmacology of loperamide hydrochloride. Indications for use. Side effects. Probiotics	2
21	**Drugs affecting the blood coagulation system and fibrinolysis.** Classification of drugs that affect hemostasis. Medicines that affect blood coagulation, fibrinolysis, and platelet aggregation. Classification of agents used for the prevention and treatment of bleeding. Classification of coagulants. Pharmacokinetics, pharmacodynamics of menadione. Indications for use. Pharmacology of hemostatic agents of other groups (aminocaproic acid tranexamic acid, aprotinin, eptacog-alpha, etamsylate sodium, calcium chloride, thrombin). Classification of agents used for the prevention and treatment of thrombosis. Classification of anticoagulants. Pharmacokinetics, pharmacodynamics of heparin. Indications and contraindications for use. Side effects. An overdose of heparin, relief measures (protamine sulfate). Low molecular weight heparin preparations (fraxiparin, enoxaparin). Antithrombotic agents: factor Xa inhibitors	2

	(rivaroxaban) and direct thrombin inhibitors (dabigatran etexilate) Indirect anticoagulants (warfarin). Indications for use. Side effect of indirect anticoagulants. General characteristics of fibrinolytic agents. Pharmacology of fibrinolysin, alteplase. Indications for use. Side effect. General characteristics and mechanisms of action of agents that reduce platelet aggregation (acetylsalicylic acid, dipyridamole, clopidogrel, pentoxifylline).	
22	**Drugs that affect blood formation. Anticancer drugs.** Classification of agents that affect hematopoiesis. General characteristics of drugs that affect blood formation. Medicines that affect erythropoiesis. Stimulants of erythropoiesis. Classification and general characteristics of stimulants of erythropoiesis. Indications for use. Medicines used for hypochromic anemia. Pharmacokinetics, pharmacodynamics of iron preparations (iron (II) sulfate, iron (III) hydroxide polymaltose, iron (III) carboxymaltose). Combined drugs (ferroplekt). Drug, which is erythropoietin (epoetin alpha). Indications for use. Side effects. Acute iron poisoning and relief measures. Pharmacological characteristics of the drugs used to treat hyperchromic anemia. Pharmacokinetics, pharmacodynamics of cyanocobalamin and folic acid. Medicines that affect leukopoiesis. The mechanism of action of leukopoiesis stimulants (sodium nucleinate, methyluracil, filgrastim). Indications for use. General characteristics of drugs that inhibit leukopoiesis (mercaptopurine, methotrexate). Indications for use, side effects.	2
Content module 6. ***Vitamin, hormonal, anti-inflammatory, anti-allergic and immunotropic drugs.***		
23	**Vitamin preparations. Antivitamins.** Vitamin therapy and its types. Classification of vitamin preparations. General characteristics of water-soluble vitamin preparations. Pharmacology of thiamine bromide, riboflavin, pyridoxine, nicotinic acid, cyanocobalamin, folic acid, metafolin, ascorbic acid, calcium pangamate, calcium pantothenate. Indications for use, side effects. The concept of bioflavonoids (rutin, quercetin), coenzyme preparations. Multivitamin preparations. The concept of antivitamins. General characteristics of fat-soluble vitamin preparations. Pharmacology of retinol acetate, indications for use. The concept of retinoids, their pharmacological properties and indications for use (tretinoin, isotretinoin, etretinate). Pharmacology of tocopherol acetate. Pharmacology of phylloquinones and menachinones. Pharmacological properties of menadione (vitamin K3). Pharmacological properties and use of phytomenadione. Indications and contraindications for use. Pharmacology of vitamin D preparations - native vitamins (ergocalciferol, cholecalciferol), structural analogues of vitamin D2 (dihydrotochesterol), active metabolites of vitamin D (calcitriol, alphacalcidol). Side effects of fat-soluble vitamin preparations. Multivitamin preparations. The concept of antivitamins.	2
24	**Hormonal drugs (peptide), their synthetic substitutes and antagonists.** General characteristics of hormonal drugs. Classification of hormonal drugs by origin. The mechanism of action of hormonal drugs. Indications for use. Hormonal drugs of the pituitary and hypothalamus (oxytocin, oxotide). Hypoglycemic drugs. Classification of hypoglycemic agents. Pharmacokinetics, pharmacodynamics, indications and contraindications for the use of insulin. Classification of natural insulin by duration. Pharmacology of actrapide, humulin, insulin glargine. Combined insulin. Side effects. Features of use in hyperglycemic coma. An overdose of insulin, emergency care in hypoglycemic coma. Synthetic antidiabetic drugs sulfonylurea derivatives (glibenclamide, glyclazide), biguanide derivatives (metformin), prandial glycemic regulators (repaglinide), insulin	2

	sensitizers (pioglitazone, rosiglitazone), α-glucosidase inhibitors. Comparative characteristic, side effects. Medicine for the treatment of hypoglycemia – glucagon. Medicines used in diseases of the thyroid gland. Thyroid hormones (levothyroxine, thyrocomb), antithyroid drugs (thiamazole). Pharmacology iodine containing drugs (potassium iodide). Indications and contraindications for use, side effects.	
25	***Hormonal drugs (steroidal), their synthetic substitutes and antagonists.*** Hormonal drugs of the adrenal cortex. Pharmacological effects, indications, contraindications, dosage, regimen for substitutive therapy (hydrocortisone, prednisone, dexamethasone, methylprednisolone, triacinolone, betamethasone). Comparative characteristics. The concept of glucocorticosteroid (GCS) and mineralcorticoid activity. Side effects. Pharmacology deoxycortone (deoxycorticosterone acetate). Indications for use. Sex hormone preparations. Classification. General characteristics of female sex hormones. The mechanism of action and indications for the use of estrogenic (estradiol, estrone) and gestagenic (progesterone, dydrogesterone, levonorgestrel) drugs, depending on age-related hormonal changes in women. Antagonists of estrogenic (clomiphene, tamoxifen) and gestagenic (mifepristone) hormones. Male sex hormone preparations. Pharmacological characteristics of testosterone propionate, methyltestosterone. Indications for use, side effects. Antagonists of androgen hormones (cyproterone, bicalutamide, flutamide). Pharmacology of anabolic steroids. The mechanism of action, indications for use (nandrolone, methandrostenolone). Side effects of anabolic steroids.	2
Content module 7. ***Antimicrobial, antiviral, antifungal, antiparasitic, antiprotozoal drugs.***		
26	**Antiseptic and disinfectant medicines.** Antiseptic and disinfectant medicines. The concept of antiseptics and disinfection. The history of the use of antiseptic agents. Requirements for modern antiseptic agents. Classification of antiseptic and disinfectants by chemical structure. Pharmacology of antiseptic and disinfectants of an inorganic nature. The mechanism of action, indications for the use of oxidizing agents (hydrogen peroxide, potassium permanganate). The dependence of the action on the concentration of the solution. The mechanism of action of halogens and halogen-containing compounds (chlorhexidine bigluconate, Citeal, sodium hypochloride, alcohol iodine solution, Iodicerin, iodinol, povidone-iodine). Indications for use. Side effects. The antiseptic and disinfecting effect of acid and alkali preparations (boric acid, salicylic acid, citric acid, sodium bicarbonate, ammonia solution, sodium tetraborate). Local and resorptive action of acids and alkalis. Indications for use. Acute poisoning by acids and alkalis. Help measures. The mechanism and types of action of salts of heavy metals (pre-resorptive, resorptive). Factors that determine the antimicrobial activity of drugs of salts of heavy metals. Schmiedeberg row. Features of the use of mercury, lead, silver, bismuth, copper, zinc.	2
27	**Antiseptic and disinfectant medicines (continued).** Antiseptic and disinfectant medicines. The concept of antiseptics and disinfection. The history of the use of antiseptic agents. Requirements for modern antiseptic agents. Classification of antiseptic and disinfectants by chemical structure. Pharmacology of antiseptic and disinfectants of an organic nature. Derivatives of the aromatic series. The mechanism of action of phenol group drugs (phenol, resorcinol, thymol). Side effects. Acute poisoning with phenolic compounds, emergency care. The mechanism of action of nitrofurans, indications and	2

	contraindications for use. Comparative characteristics of drugs (furacilin, furazolidone). The mechanism of the antimicrobial action of dye preparations. Pharmacological characteristics of brilliant green, methylene blue, ethacridine lactate. Indications for use. Derivatives of the aliphatic series. Pharmacokinetics, pharmacodynamics of formaldehyde. Side effect. The mechanism of action of alcohols (ethyl alcohol, isopropyl alcohol). Use in dentistry. Pharmacology of super-active substances. The mechanism of action, indications for the use of detergents (etonium, decamethoxin, chlorhexidine bigluconate, miramistin). The use of antibacterial agents of plant origin (sanguirythrin, chlorophyllipt, eucalymin, periodontocide). Combined drugs (Sterilium, Kutasept).	
28	**Synthetic antimicrobial agents. Fluoroquinolones. Antimycotics.** Synthetic antimicrobial agents. Sulfanilamide preparations. Classification of sulfanilamide drugs according to the duration of action and the characteristics of pharmacokinetics. Pharmacokinetics and pharmacodynamics of sulfonamides. The spectrum of antimicrobial action, the sensitivity of microorganisms to drugs of this group. Indications for use. Side effects and ways for its prevention. The combination of sulfonamides with trimethoprim (co-trimoxazole). Derivatives of quinolones of I–IV generation. Classification, mechanism of action, indications for use, side effects. Characterization of drugs (nitroxoline, nalidixic acid). The peculiarity of the use of fluoroquinolone derivatives (ofloxacin, ciprofloxacin, levofloxacin, moxifloxacin) in medical practice. Derivatives of nitrofuran. The mechanism of action, indications for use, route of administration, side effects (furacilin, furazolidone, furagin, nifuroxazide). Synthetic antimicrobial drugs of various chemical structures (hydroxymethylquinoxalindioxide, dioxole, metronidazole). Antifungal (antimycotic) drugs. Classification of antimycotic agents by origin and purpose. Pharmacokinetics, pharmacodynamics of polyenes (nystatin, amphotericin B, natamycin), imidazole (ketoconazole, clotrimazole, miconazole), triazole (fluconazole, itraconazole), allylamines (terbinafine). Antifungal agents of different groups (Dequalinium chloride). Indications for use. Side effects.	2
29	**Pharmacology of antibiotics.** The concept of antibiosis, antibiotics, the spectrum of antibiotics. The history of the discovery and introduction of antibiotics in medical practice. Pasteur, Mechnikov, Fleming, Flory, Cheyne, Ermolyev, Waxman, Derkach. The principles of antibiotic therapy. Classification of antibiotics by chemical structure, spectrum and mechanism of action. Group of penicillins. Classification. The mechanism of the spectrum and duration of action. Routes of administration. Pharmacological characteristics of penicillin group preparations (benzylpenicillin sodium salt, benzathine benzylpenicillin, bicillin-5, oxacillin sodium salt, ampicillin, amoxicillin, phenoxymethylpenicillin). Pharmacological characteristics of carbapenems (meropenem) and monobactams (aztreonam). Comparative characteristics of drugs, indications for use, side effects. Relief measures for anaphylactic shock connected with administration of penicillin antibiotics. The principles and purpose of the combination of penicillin preparations with β-lactamase inhibitors: clavulanic acid (amoxiclav), sulbactam, tazobactam. A group of cephalosporins. Classification of drugs by route of administration and by generations (generations). The mechanism and spectrum of action. Indications for use. Comparative characteristics of cephalosporin group preparations (cefazolin, cephalexin, cefuroxime, ceftriaxone, cefpirome). Side effect of cephalosporins. The mechanism and spectrum of action, indications for use, side effects.	2
30	**Pharmacology of antibiotics (continued).**	2

	The principles of antibiotic therapy. Classification of antibiotics by chemical structure, spectrum and mechanism of action. General characteristics, mechanism and spectrum of action, indications for use, side effects. Pharmacological characteristics of macrolides (erythromycin, spiramycin, josamycin, roxithromycin, clarithromycin, azithromycin). Pharmacological characteristics of lincosamides (lincomycin hydrochloride, clindamycin). The mechanism of action, comparative characteristics, indications and contraindications for use, side effects. Pharmacological characteristics of tetracyclines (tetracycline, doxycycline hydrochloride), antimicrobial activity, classification, side effects and contraindications. Pharmacological correction and prevention of complications with the use of tetracyclines. Preparations of the nitrobenzene group (chloramphenicol). The mechanism and spectrum of action, indications for use, side effects. Cyclic polypeptides (polymyxins) (sodium colistimethate). Range of action, indications for use. Pharmacology of aminoglycoside preparations (streptomycin sulfate, gentamicin sulfate, amikacin sulfate). Pharmacology of glycopeptide preparations (vancomycin, teicoplanin). Comparative characteristics, mechanism of action, indications and contraindications for use, side effects. Pharmacology fusidine sodium. Indications for use. Side effects. Pharmacology of antibiotics of various chemical groups (mupirocin).	
31	**Antituberculous, antiviral, antispirochetic drugs.** Anti-TB drugs. The basic principles of treatment and prevention of tuberculosis. Classification of drugs used to treat tuberculosis. Pharmacokinetics, pharmacodynamics of isonicotinic acid hydrazide derivatives (isoniazid). Side effects that occur with prolonged use of anti-TB drugs and ways to prevent them. Antibiotic drugs in the treatment of tuberculosis (rifampicin, streptomycin sulfate, kanamycin, cycloserine, amikacin). Side effects. Antisyphilitic drugs. General characteristics of anti-syphilitic drugs. Principles for treating syphilis. Classification of antisyphilitic drugs. Features of the use of antibiotics (penicillins, macrolides, cephalosporins), bismuth preparations (bioquinol) in the treatment of syphilis. Antiviral drugs. Classification of antiviral drugs according to the mechanism of action and indications for use. Pharmacological characteristics of drugs used for the prevention and treatment of influenza (rimantadine, oseltamivir, interferons). Antiviral drugs. Classification of antiviral drugs according to the mechanism of action and indications for use. Pharmacological characteristics of drugs used for the prevention and treatment of influenza (rimantadine, oseltamivir, interferons).	2
32	***Antiparasitic and antiprotozoal drugs.*** Basic principles for the prevention and treatment of malaria. Classification of antimalarial drugs. Mechanism of action. Pharmacological characteristics of chloroquine, primaquine, quinine, pyremethamine, fansidar. Indications and contraindications for use, side effects. Medication for malaria coma. Antiprotozoal agents (metronidazole, tinidazole). Anthelmintic drugs. Classification of anthelmintic drugs. Features of application for various types of helminthiases. Pharmacological characteristics of the drugs used to treat nemotodoses (levamisole, pyrantel, piperazine adipinate, diethylcarbamazine), trematodoses (praziquantel) cestodoses (niclosamide). Anthelmintic agents of a wide spectrum of action mebendazole, albendazole. Anthelmintic prevention.	2
Content module 8. ***Preparations of macro- and microelements. Enzyme and antienzyme preparations. Plasma substitutes and preparations for parenteral nutrition. Medicines used for the***		

treatment and prevention of diseases of hard tissues, tooth pulp and periodontal disease. Drugs that affect the metabolism of bone and cartilage. Antidotes.		
33	**Macro and micronutrient preparations, enzyme and antienzyme preparations, plasma substitutes and preparations for parenteral nutrition.** Preparations of macro- and microelements. Potassium preparations (potassium chloride, asparcam, panangin. Pharmacodynamics, indications for use. Magnesium preparations (magnesium sulfate). Pharmacokinetics, pharmacodynamics. The dependence of the effect on the route of administration. Indications for use. Calcium preparations (calcium chloride, calcium gluconate). Pharmacological effects, indications for use, route of administration. Sodium preparations (sodium chloride). Pharmacological effects of isotonic, hypertonic and hypotonic sodium chloride solution. Indications for use. Energy, antitoxic, osmotic effect of glucose (glucose), indications for the use of isotonic and hypertonic glucose solution. Medical use of oxygen. Plasma replacing fluids. General characteristics of plasma substitutes. Pharmacological and indications for the use of saline solutions (isotonic sodium chloride solution, Ringer-Lock solution, trisol), alkaline solutions (sodium bicarbonate, trisamine), sugars (glucose), preparations containing human blood components (human albumin), synthetic preparations (reopoliglukin, neohaemodesis, refortan). Preparations for parenteral nutrition (lipofundin). Classification of enzyme preparations. The mechanism of action and indications for use of peptidases (pepsin), proteases (crystalline trypsin, crystalline chymotrypsin), nucleases (ribonuclease, deoxyribonuclease), hyaluronidase preparations (lidase, ronidase). Fibrinolytic agents (streptoliasis, alteplase, urokinase, fibrinolysin). Indications for their use. General characteristics of enzyme inhibitors (aprotinin, aminocaproic acid). Classification. Indications and contraindications for use	2
34	**Medicines used for the treatment and prevention of diseases of solid tissues, tooth pulp and periodontal disease. Drugs affecting the metabolism of bone and cartilage.** Pharmacology of drugs for the treatment of diseases of hard tissues and pulp of the tooth and periodontium. Means for pulp devitalization (paraformaldehyde, arsenic anhydride). The mechanism of action, side effects. Hemostatic agents for capillary bleeding (caprofer, hemostatic sponge, thrombin). Impregnating agents (silver nitrate, arginate). Mechanism of action. Possible complications and emergency. Agents for recalcification and stimulation of odontogenesis - odontotropny paste based on calcium hydroxide (calcemin, calxil, calcimol LC) and zinc oxide (zinc, zinc-eugenol, iodoform). Pharmacological characteristics, mechanisms of action and indications for use. Antiseptics and dilators of tooth canals (sodium hypochlorite, citric acid, isopropyl alcohol, hydrogen peroxide, chlorhexidine). Pharmacological characteristics, mechanisms of action and indications for use in dentistry. Proteolytic enzymes (crystalline trypsin, terilithin, chymopsin, lysozyme, ribonuclease). Mechanisms of action and indications for use in dentistry. Pharmacology of agents for the treatment of periodontal and oral mucosa diseases (periodontitis, stomatitis), including the drugs for increase the general resistance of the organism (vitamin preparations, immunostimulants (methyluracil, nucleinate, imudon, prodigiosan), calcium preparations (calcium glycerophosphate), agents for stimulation of the regeneration of periodontal tissues (solcoseryl, insadol, calcitonin) and epithelialization of the oral mucosa – keratoplastic (retinol, tocopherol acetate, aevit, aecol, carotolin, vinisol, vinylin),	2

	agents having influence on tissue biostimulants (actovegin, solcoseryl, aloe extract), astringents (tannin, oak bark), plant aantiseptics (chlorophyllipt, sanguirythrin, rotokan, novoimanin). Preparations for the treatment and prevention of osteoporosis of anabolic steroids (nandrolone (retabolil) estrogens and estrogen-progestogen drugs, androgens; thyroid hormone (calcitonin) and its synthetic analogue; parathyroid hormone analogue (teriparatide) bisphosphonates (etidronic acid, xidifonic acid) preparations of vitamin D (ergocalciferol, cholecalciferol, dihydrotachysterol, calcitriol), preparations of calcium (calcium carbonate, osteogenon), preparations of strontium (strontium ranelate) and fluorine (sodium fluoride). The basic principles of pharmacotherapy of purulent-inflammatory processes in the maxillofacial region. The use of antiseptics, chemotherapeutic antimicrobial agents (sulfonamides, antibiotics), enzymes and anti-enzymes, antihistamines.	
35	**Principles of treatment of acute poisoning. Principles of antidote therapy. Antidote drugs. Principles for the treatment of emergency conditions.** The basic principles of pharmacotherapy of acute drug poisoning. Causes of acute poisoning. Symptoms of acute poisoning with drugs of various pharmacological groups. Methods of active detoxification, the use of emetic, laxatives, covering agents, astringents and adsorbents. The use of active diuretics in order to remove toxic substances from the blood (forced diuresis), the use of hemodialysis, peritoneal dialysis, hyperbaric oxygenation, hemo- and lymphosorption. The concept of antidotes. Types of antidote therapy. Pharmacology dimercaprol, acetylcysteine, tetacin-calcium, penicillamine, deferoxamine, cholinesterase reagents. Principles of symptomatic therapy of acute poisoning. Side effects of heavy metal salt preparations. Acute poisoning. Emergancy care in case of acute poisoning with salts of heavy metals, the principles of antidote therapy. The basic principles of pharmacotherapy of emergency conditions. Causes of emergency conditions. Symptoms of emergency conditions. Pharmacotherapy in different emergency conditions including acute vascular insufficiency (fainting, collapse, shock), pain syndrome with myocardial infarction and cardiogenic shock, acute left and right ventricular failure (cardiac asthma, pulmonary edema), cardiac arrhythmias, cerebrovascular accidents and cerebral edema of hypertensive crisis, angina attack (stenocardia); attack of bronchial asthma and asthmatic condition, asphyxia and respiratory arrest, anaphylactic shock, seizures and colic pharmacotherapy, hyperglycemic and hypoglycemic coma, acute thrombosis, and hemorrhage bleeding after tooth extraction.	2
36	**Test control of theoretical training from the KROK-1 database for content modules 5-8*.** Test control of theoretical training.	2
Total		**72**

Note: * topics of practical classes, which must be evaluated positively.

Independent work

1	Preparation for practical classes - theoretical preparation and development of practical skills.	44
2	**Processing of topics that are not included in the classroom lesson plan (list):**	28
	Astringent, enveloping, adsorbing, irritating drugs. Medicines that affect the afferent innervation. Classification of drugs that affect the afferent innervation (drugs that reduce the sensitivity of the endings of the afferent	2

	nerves and drugs that stimulate the endings of the afferent nerves). Medicines for local anesthesia. Organic and inorganic astringent medicines. The mechanism of action, indications for use. Pharmacological characteristics of tannin, bismuth basic nitrate, phytopreparations containing surface substances, St. John's wort grass, sage leaves, and chamomile flowers. Complex preparations based on these plant medicines. General characteristics of covering agents. The mechanism of action, indications for use (starch mucus, flax seeds). Adsorbent drugs. Classification of adsorbent agents. Mechanism of action. Indications for use. Coal preparations (activated carbon). Synthetic sorbents (enterosgel). The principles of hemo- and enterosorption. Medicines that irritate the endings of the sensory nerves (menthol, ammonia solution).	
	Inhalation drugs for anesthesia. Classification of anesthetic agents. Requirements for anesthetic agents. Theories of anesthesia. Comparative characteristics of inhalation anesthetics (halothane, isoflurane, sevoflurane, dinitrogens, xenon). Side effects. Combined use of anesthetic agents with drugs of other pharmacological groups.	2
	Pharmacology of normotimitics. Normotimics (lithium preparations – lithium). Pharmacokinetics and pharmacodynamics, indications for use. Side effects. Acute poisoning with lithium preparations. Help in case of poisoning.	1
	Antiarrhythmic drugs. Antiarrhythmic drugs. Classification of antiarrhythmic drugs according to indications for use and mechanism of action. Pharmacokinetics and pharmacodynamics of antiarrhythmic drugs with a membrane-stabilizing effect (quinidine sulfate, procainamide, lidocaine hydrochloride, trimecaine, diphenin, ethacyzine, propafenone). Comparative characteristics of drugs. Indications for use. Beta-blockers (propranolol, atenolol, metoprolol, bisoprolol), potassium channels blockers (amiodarone), calcium channels blockers (verapamil) and and selective and specific sinus node If-flow inhibitor (ivabradine) in the treatment of different heart rhythm disturbances. Mechanism of antiarrhythmic actions of potassium preparations (potassium chloride, asparcam).	2
	Drugs that affect kidney function. Diuretic drugs. Classification of diuretics by chemical structure, localization, activity and mechanism of action. Pharmacokinetics and pharmacodynamics of furosemide, torasemide, acetazolamide, hydrochlorothiazide, indapamide. Indications for use, side effects. Comparative characteristics of potassium-sparing diuretics (spironolactone, eplerenone, triamteren). The concept of forced diuresis. Osmotic diuretics (mannitol). Indications for use. Side effects. Medicinal plants with a diuretic effect (herbal remedies, in particular artichoke extract, horsetail grass, orthosiphon leaves). The principle of the combined use of diuretics.	5
	Drugs that affect the function of the digestive system (continued). General pharmacological characteristics, classification of drugs that affect the function of the digestive system. Drugs that affect appetite. General pharmacological characteristics, classification of drugs that affect appetite and are used to treat anorexia and bulimia. Drugs that stimulate appetite - bittering agents (wormwood). The concept of anorexigenic drugs. Pharmacology of orlistat. Drugs used in disorders of the gastric glands. General pharmacological characteristics of drugs that stimulate the secretion of gastric glands and are used for diagnosis (pentagastrin) and replacement therapy (pepsin, natural gastric juice, dilute hydrochloric acid).	3
	Vitamin preparations. Antivitamins (continued).	4

	The concept of retinoids, their pharmacological properties and indications for use (tretinoin, isotretinoin, etretinate). Multivitamin preparations. The concept of antivitamins.	
	Antiallergic and immunotropic drugs. Antiallergic drugs. The concept of histamine receptors. Classification and general characteristics of antiallergic drugs. Drugs used for immediate type hypersensitivity (glucocorticoids, antihistamines, fibrinolysis inhibitors, adrenomimetics, cholinergics, antispasmodics, bronchodilators). Features of application. Pharmacology of antihistamines - histamine H1-receptor blockers (diphenhydramine, chloropyramine, clomidine, loratadine, desloratadine, cetirizine, levocetirizine). Principles of drug classification. Comparative characteristics, side effects. Pharmacokinetics, pharmacodynamics, indications for the use of cromolyn sodium, ketotifen. Principles of care in anaphylactic shock. Drugs used in delayed hypersensitivity. Drugs that affect immune processes. General characteristics of drugs that reduce tissue damage (steroid and non-steroidal anti-inflammatory drugs). Drugs that affect the immune system. Classification of immunomodulators. Pharmacology of thymus drugs (thymalin), leukopoiesis stimulants (sodium nucleinate, methyluracil), interferons and vaccines. Immunosuppressive drugs (antimetabolites (azathioprine, methotrexate), alkylating compounds, glucocorticoids, enzyme drugs). Classification and general characteristics, indications for use, side effects. Pharmacology of immunosuppressants (cyclophosphamide, cyclosporine, infliximab, leflunomide).	5
	Medicines used for the treatment and prevention of diseases of solid tissues, tooth pulp and periodontal disease. Drugs affecting the metabolism of bone and cartilage (continued). Basic principles of pharmacotherapy of purulent and inflammatory processes in the maxillofacial area. The use of antiseptics, chemotherapeutic antimicrobial agents (sulfonamides, antibiotics), enzymes and antienzymes, antihistamines.	4
3	Preparation for the exam	12
Total		**84**

Individual tasks

1. Report on the practical lesson.
2. Participation in the 1-st round of the All-Ukrainian Olympiad in Pharmacology.Report - presentation in Power Point format at a practical lesson.
3. Creating visual patterns of action of drugs in the form of tables, figures and posters for practical exercises and lectures in electronic form.
4. Victory in the first round of the All-Ukrainian Olympiad in Pharmacology (I-III places).
5. Report at a meeting of the scientific circle of the department.
6. Scientific publication (thesis) on pharmacology in the materials of scientific and practical conferences.
7. Work in the student scientific society and a report at scientific and practical conferences from the Department of Pharmacology.
8. Scientific publication (article) based on materials of our own research in pharmacology.

List of theoretical questions to prepare higher education students for the exam

Content module I. Medical prescription.

1. The concept of medical prescription. Determine the time: drug, medicine, dosage form, and non-dosage form.
2. The recipe. General rules for writing prescriptions. Forms of prescription. Prescribing rules for medicines containing potent, toxic and narcotic substances.

3. Dosage forms. Types of dosage forms, especially the manufacture and prescription in prescriptions. Requirements for injectable dosage forms.
4. The definition of pharmacology, its place among other medical and biological sciences.
5. The origin and formation of experimental pharmacology, the development of pharmacology in Ukraine and other countries.
6. Basic principles and test methods for new drugs. Preclinical and clinical studies (phases I - IV). The concept of placebo. Functions of the State Pharmacological Center of the Ministry of Health of Ukraine. Law of Ukraine "On Medicines".
7. The concept of pharmacokinetics of drugs.
8. Ways of input and output of drugs from the body, especially absorption and distribution in the body, the main types of biotransformation.
9. The concept of the main pharmacokinetic parameters (constant absorption rate, half-life, stationary concentration, clearance of the drug).
10. Age features of pharmacokinetics.
11. Definition of the concept of dose, types of doses.
12. Pharmacodynamics of drugs.
13. The concept of receptors (agonists, antagonists).
14. Types and methods of action of drugs.
15. The dependence of the pharmacological effect on the properties of drugs (chemical structure, physico-chemical properties, their doses and frequency of use).
16. The dependence of the pharmacological effect on the age and gender of the patient. Features of the reaction of the child's body to the drug. Principles of dosage of medicines for children and the elderly.
17. The importance of climatic and anthropogenic factors for the pharmacological action of the drug.
18. The dependence of the action of drugs on the physiological characteristics of the body and pathological conditions.
19. The concept of pharmacogenetics and chronopharmacology.
20. Features of the action of drugs in their repeated use. The concept of material and functional cumulation, tolerance or addiction, mental and physical dependence. The concept of abstinence and withdrawal syndromes.
21. The combined effect of drugs (synergism and antagonism).
22. The concept of drug safety. Side effects of drugs. Types of side effects. Intolerance. Idiosyncrasy. Allergic reactions. Mutagenicity, teratogenicity, embryotoxicity, fetotoxicity, carcinogenicity.

Content module 2. Medicines affecting the peripheral nervous system.

1. The principles of classification of local anesthetics, mechanism of action, comparative characteristics of drugs. Indications for use, side effects.
2. Pharmacology of astringent drugs. The mechanism of action, indications for use. Pharmacological characteristics of these drugs.
3. General characteristics of covering drugs. The mechanism of action, indications for the use of drugs.
4. The principles of classification of adsorbing agents. Mechanism of action. Indications for use. Coal preparations and synthetic sorbents.
5. The principles of classification of irritating agents. Mechanism of action. Effects on the skin and mucous membranes. Indications for use.
6. The principles of classification of agents affecting the autonomic nervous system.
7. The principles of classification of drugs that affect the cholinergic nervous system. M- and N-cholinomimetic drugs.
8. The principles of classification of anticholinesterase drugs. The mechanism of action, pharmacological effects, indications for use, side effects.
9. Features of the action of organophosphorus compounds. Acute poisoning of organophosphorus compounds and relief. Pharmacology of reactants organophosphorus compounds.

10. The principles of classification and pharmacological characteristics of M-cholinomimetics. Impact on organs and systems. Indications for use.
11. Acute muscarinic poisoning. Relief measures, antidote therapy.
12. Medicines affecting N-cholinergic receptors.
13. Pharmacological effects of nicotine. Smoking as a medical and social problem. Medicines used to combat tobacco smoking.
14. The principles of classification of M-anticholinergic drugs. Pharmacological characteristics of atropine sulfate. Indications for use.
15. Acute poisoning with atropine and plants containing alkaloids, containing in atropine. Assistance measures.
16. General characteristics of N-anticholinergic antagonists. Classification of ganglion blockers. Mechanism of action. Pharmacological effects, indications for use, side effects.
17. The principles of classification of muscle relaxants. Pharmacokinetics, pharmacodynamics of tubacurarin chloride. Indications for use, side effects.
18. Principles for the classification of drugs affecting adrenergic innervation.
19. Pharmacological characteristics of adrenergic agonists. Pharmacokinetics, pharmacodynamics of adrenaline hydrochloride. Indications for use.
20. Comparative characteristics of adrenergic agonists. Side effects.
21. The principles of classification of antiadrenergic drugs. Features of the use of α-adrenoblocker agents, mechanism of action and indications for use.
22. Pharmacological effects of β-adrenoblocker agents. Comparative characteristics of drugs. The concept of internal sympathomimetic activity.
23. Pharmacology of sympatholytic agents. The mechanism of action and indications for use, side effects.

Content module 3. Medicines that affect the function of the central nervous system. Psychotropic drugs.

1. Principles of classification of drugs for anesthesia.
2. History of the discovery of drugs for anesthesia.
3. Types of anesthesia. Requirements for drugs for anesthesia. Theories of anesthesia.
4. The principles of classification of drugs for inhalation anesthesia. Comparative characteristics of drugs, side effects. The combined use of drugs for anesthesia with drugs of other pharmacological groups.
5. The principles of classification of drugs for non-inhalation anesthesia. Comparative characteristics of drugs.
6. The concept of sedation, induction, basic, combined anesthesia.
7. Pharmacology and toxicology of ethyl alcohol, use in clinical practice.
8. Acute and chronic alcohol poisoning, relief measures. The principle of treatment for alcoholism.
9. Antiepileptic drugs. Classification principles, comparative characteristics, side effects of antiepileptic drugs.
10. Antiparkinsonian drugs. Classification. The main mechanisms of action. Clinical use.
11. Opiate analgesics. Classification by chemical structure, origin and affinity for opiate receptors. Mechanism of action.
12. Pharmacology of morphine hydrochloride. Features of the effect of the drug on the central nervous system. Comparative characteristics of opiate analgesics. Indications for use. Side effects.
13. Acute poisoning with opiate analgesic agents. Clinical manifestations and measures of assistance.
14. Drug addiction arising in opiate analgesics, clinical manifestations. The concept of withdrawal symptoms, methods of its correction.
15. Non-opiate analgesics. Classification principles, general characteristics of the group. Mechanisms of action. Pharmacological characteristics of drugs.
16. Comparative characteristics of non-opiate analgesic drugs, side effects.

17. The principles of classification of psychotropic drugs. General characteristics.
18. Antipsychotics. The principles of classification. The mechanism of antipsychotic action of antipsychotics.
19. Pharmacological effects of chlorpromazine.
20. Comparative characteristics of antipsychotic drugs, indications for use, side effects of antipsychotics. Combined use with drugs of other pharmacological groups.
21. The concept of antipsychotics.
22. Pharmacology of tranquilizers. Classification. The mechanism of tranquilizing action, the concept of benzodiazepine receptors.
23. Comparative characteristics of tranquilizer preparations.
24. Indications and contraindications for the use of tranquilizers, side effects. Drug addiction connected with tranquilizer preparations.
25. The combined use of tranquilizers with drugs of other pharmacological groups. The concept of ataralgesia.
26. The principles of classification of hypnotics. General characteristics of hypnotics, possible mechanisms of action.
27. Comparative characteristics of hypnotics of various groups. Indications for use, side effects.
28. Acute poisoning with barbiturates, relief measures.
29. The principles of classification of sedative agents.
30. Pharmacology of bromides. Indications for use, side effects.
31. Bromism – clinical signs, treatment, and prevention.
32. Sedative herbal medicines.
33. Pharmacology of lithium preparations. Pharmacokinetics and pharmacodynamics, indications for use. Side effects. Acute lithium poisoning.
34. Psychomotor stimulants. General characteristics of the group of psychostimulants.
35. Caffeine-sodium benzoate. Pharmacokinetics and pharmacodynamics, indications for use, side effects.
36. The concept of psychodysleptics and amphetamines. Formation of dependence, social significance.
37. Pharmacology of antidepressants. Classification of antidepressants by the mechanism of action and chemical structure. Comparative characteristics. Side effects of antidepressants.
38. Classification of nootropic drugs. Possible mechanisms of action. Indications for use. Pharmacological characteristics of drugs.
39. Adaptogens and actoprotectors. Indications for use. The main properties of drugs, comparative characteristics.
40. Pharmacology of analeptics. Classification, characteristics of drugs, indications for use.

Content module 4. Drugs affecting the function of the cardiovascular system.

1.Classification of cardiotonic drugs.
2.Pharmacokinetics and pharmacodynamics, indications and contraindications for the use of cardiac glycosides. Side Effects of Cardiac Glycosides.
3.Acute and chronic cardiac glycoside poisoning, relief measures and prevention.
4.Pharmacological characteristics of non-glycoside cardiotonic agents. Indications for use.
5.Classification of antiarrhythmic drugs. Pharmacological characteristics of antiarrhythmic drugs.
6.Comparative characteristics, indications for the use of antiarrhythmic drugs.
7.Classification and general pharmacological characteristics of antianginal drugs.
8.Pharmacokinetics and pharmacodynamics of nitroglycerin, side effects.
9.The mechanism of action and characteristics of calcium channel blockers (calcium antagonists). Pharmacological characteristics of drugs.
10. Features of the use of β-blocker agents in the treatment of patients with coronary heart disease.
11. Vasodilative agents of myotropic action, reflex type of action and energy supplying agents. Indications and contraindications for use, side effects.
12. The principles of complex therapy of myocardial infarction. General characteristics of

pharmacological groups.

13. Hypolipidemic drugs. General pharmacological characteristics of lipid-lowering drugs, the direction of action.
14. The concept of angioprotectors. Pharmacokinetics and pharmacodynamics of drugs.
15. Modern clinical classification of antihypertensive agents.
16. Antihypertensive drugs of the additional group.
17. Principles of combination of antihypertensive drugs.
18. The pharmacological characteristics of these groups, the rate of development of the hypotensive effect. Medication, which are useful in hypertensive crisis.

Content module 5. Medicinal products that affect the function of the kidneys, respiratory system, digestion and blood system. Antineoplastic drugs.

1. Classification of diuretic drugs. Pharmacokinetics and pharmacodynamics, indications for use, side effects. The concept of forced diuresis.
2. Classification of anti-gout medications. General characteristics of drugs, side effects.
3. Classification of drugs that affect the blood system. Classification of drugs used for the prevention and treatment of thrombosis. General characteristics.
4. Classification of anticoagulants. Pharmacokinetics, pharmacodynamics of drugs, indications and contraindications for use. Side effects.
5. General characteristics of fibrinolytic agents. Indications for use. Side effects.
6. Classification of coagulants. Pharmacokinetics, pharmacodynamics, indications for the use of coagulant preparations.
7. Medicines that stimulate erythropoiesis. Pharmacokinetics, pharmacodynamics, indications for use, side effects.
8. Medicines affecting leukopoiesis. The mechanism of action of leukopoiesis stimulants. Indications for use.
9. General characteristics of drugs that inhibit leukopoiesis. Indications for use, side effects.
10. Antitumor (anti-blastoma) drugs. Classification and general characteristics of antitumor agents.
11. The concept of radioisotope drugs, indications for use, side effects.
12. Respiratory stimulants. Classification. Pharmacokinetics, pharmacodynamics, indications for the use of respiratory stimulant preparations.
13. Antitussive drugs. Classification, characteristics of drugs. Side effects.
14. Expectorant medicines. Classification. Pharmacokinetics and pharmacodynamics, side effects of expectorants.
15. Stimulants for the synthesis of surfactant. General characteristics of surfactant synthesis stimulants.
16. Classification of bronchodilator drugs. General characteristics of drugs.
17. Medicines used in pulmonary edema. Tactics for assisting with pulmonary edema, the choice of drugs.
18. Classification of drugs that affect appetite. General pharmacological characteristics of drugs.
19. Emetic drugs. The mechanism of action and application features**.**
20. Pharmacological characteristics of antiemetics. Indications for use, side effects.
21. Classification of drugs used for violations of the function of the glands of the stomach.
22. General pharmacological characteristics of agents that stimulate the secretion of gastric glands and use for the diagnostic measures and replacement therapy.
23. Classification and general pharmacological characteristics of agents that inhibit the secretion of gastric glands.
24. Pharmacological treatments for peptic ulcer of the stomach, duodenum and hyperacid gastritis.
25. Pharmacological characteristics of H2-receptor blockers, M-cholinoblockers and proton pump blockers.
26. General pharmacological characteristics of drugs that reduce the high acidity of gastric juice.

27. The concept of gastroprotective therapy. General pharmacological characteristics of drugs.
28. Medicines affecting the excretory function of the pancreas. Indications for use.
29. Cholagogue drugs. Classification. General characteristics. Indications for use.
30. Hepatoprotectors and cholelitolytic drugs. Indications for use.
31. Classification of laxatives. Pharmacokinetics, pharmacodynamics of these drugs, indications for use.
32. General characteristics of antidiarrheal agents.

Content module 6. Vitamin, hormonal, anti-inflammatory, anti-allergic and immunotropic drugs.

1.Pharmacotherapy with vitamin preparations and its types.
2.Classification of vitamin preparations by solubility and biological role.
3.Characterization of water-soluble vitamin preparations. Indications for use, side effects. The concept of bioflavonoids, coenzyme preparations.
4.General characteristics of fat-soluble vitamin preparations. Indications and contraindications for use.
5.Side effects of fat-soluble vitamin preparations.
6.Multivitamin preparations.
7.The concept of anti-vitamins.
8.Hormonal preparations of the hypothalamus and pituitary gland.
9.The mechanism of action of corticotropin, indications for use, side effects. Synthetic analogues of corticotropin.
10. Pharmacological characteristics of gonadotropic hormonal drugs.
11. Pharmacodynamics of the drugs of the posterior pituitary gland. Indications for use.
12. Pharmacology of hormonal thyroid preparations. Antithyroid drugs. Indications and contraindications for use, side effects.
13. Calcitonin preparations. Indications for use.
14. Hypoglycemic drugs. Classification of hypoglycemic agents.
15. Pharmacokinetics, pharmacodynamics, indications and contraindications for the use of insulin. Side effects. Features of use in hyperglycemic coma.
16. Overdose of insulin, help in case of development of hypoglycemic coma.
17. Insulin preparations with prolonged action.
18. Synthetic antidiabetic drugs. Classification, mechanism of action, indications for use. Comparative characteristic, side effects.
19. Hormonal preparations of glucocorticoids. Pharmacological effects, indications, contraindications, dosage regimen. Comparative characteristics.
20. Side effects of glucocorticoids.
21. Sex hormones. Classification of sex hormones. General characteristics of female sex hormones.
22. The mechanism of action and indications for the use of estrogens, antiestrogen drugs, progestogen drugs, antigestagen agents.
23. Side effects of drugs of female sex hormones and their antagonists.
24. Contraceptive drugs. Classification, principles of combination, indications and contraindications for use, side effects. Comparative characteristics of contraceptives.
25. Classification of drugs that affect myometrium.
26. Hormonal drugs that affect the activity of the myometrium (uterotonics, tocolytics).
27. Preparations of male sex hormones. Pharmacological characteristic. Indications for use, side effects.
28. Androgen hormone antagonists.
29. Antiallergic drugs.
30. Classification and general characteristics of antiallergic drugs.
31. Medicines used for immediate hypersensitivity.
32. Pharmacology of antihistamines – H1-receptor blockers (diphenhydramine, suprastin,

phencarol, diazolin, loratadine, diprazine, desloratidine).
33. Indications for use of cromolyn sodium, ketotifen.
34. Principles of relief from anaphylactic shock. Medicines used for delayed hypersensitivity.
35. Pharmacology of immunosuppressants (cytostatic drugs, glucocorticoids).
36. Medicines that affect immune processes.
37. Medicines that affect immunity.
38. Classification of immune stimulants.
39. Pharmacology of thymus preparations (thymalin); leukopoiesis stimulants (sodium nucleinate, methyluracil), interferons and vaccines.
40. Immunosuppressive drugs (antimetabolites, alkylating compounds, glucocorticoids, enzyme preparations). Indications for use, side effects.

Content module 7. Antimicrobial, antiviral, antifungal, antiparasitic, antiprotozoal drugs.

1. The history of the use of antiseptic agents.
2. Requirements for modern antiseptic agents.
3. Classification of antiseptic and disinfectants.
4. Pharmacology of antiseptic and disinfectants of norganic nature. The mechanism of action of halogens and halogen-containing compounds. Indications, side effects. Acute poisoning and emergency care.
5. The mechanism of action, indications for the use of oxidizing agents. Comparative characteristics of drugs.
6. Antiseptic and disinfectant effects of acid and alkali preparations.
7. Pharmacology of preparations of salts of heavy metals. Mechanism of action.
8. Side effects of preparations, which are salts of heavy metals.
9. Acute poisoning. Emergency care in acute heavy metal salt poisoning, principles of antidote therapy.
10. Pharmacology of antiseptic and disinfectants of an organic nature. Aromatic derivatives.
11. The mechanism of action of drugs of the phenol group. Side effects. Acute phenol poisoning, help.
12. The mechanism of action of nitrofuran derivatives, indications and contraindications for its use. Comparative characteristics of drugs.
13. The mechanism of the antimicrobial action of dye preparations. Pharmacological characteristics of these drugs. Indications for use.
14. Antiseptics, which are derivatives of the aliphatic series. Pharmacology of formaldehyde. Side effects.
15. The mechanism of the antimicrobial action of ethyl alcohol.
16. Pharmacology of superficial detergents. The mechanism of action, indications for the use of detergents.
17. Sulfanilamide preparations. Classification.
18. Pharmacokinetics and pharmacodynamics of sulfonamides. Indications for use. Side effects and ways for its prevention. Comparative characteristics of drugs.
19. Combined preparations of sulfonamides.
20. Classification of chemotherapeutic agents. Spectrum of antimicrobial and chemotherapeutic action.
21. Synthetic antimicrobial drugs. Quinoline derivatives. Classification, mechanism of action, indications for use, side effects. Characterization of different drugs.
22. Peculiarities of the use of fluoroquinolone derivatives in medical practice.
23. Antifungal (antimycotic) drugs. Classification.
24. Pharmacological characteristics of antibiotics polyene structure and antifungal drugs of other groups. Indications for use, side effects.
25. The concept of antibiosis. Antibiotics are substances that trigger the process of antibiosis. Spectrum of action of antibiotics.
26. The history of the discovery and introduction of antibiotics in medical practice. Principles of

antibiotic therapy.

27. Classification of antibiotics by chemical structure, spectrum and mechanism of action.
28. Penicillin group of. Classification. The mechanism, spectrum and duration of action. Pharmacological characteristics of penicillin group preparations.
29. Classification of cephalosporin antibiotics.
30. The mechanism and spectrum of action of cephalosporin group antibiotics.
31. Comparative characteristics of drugs of the cephalosporin group. Side effects.
32. Antibiotics of the macrolide and azalide group. General characteristics, mechanism and spectrum of action, indications for use, side effects.
33. Antibiotics of the tetracycline group. Pharmacokinetics, mechanism and spectrum of action, indications and contraindications for use, side effects and their prevention.
34. Antibiotics of the chloramphenicol group. The mechanism of action and spectrum of action, indications, side effects.
35. Pharmacology of aminoglycoside preparations, classification. Comparative characteristics, mechanism of action, indications and contraindications for use, side effects.
36. Antibiotics of the group of cyclic polypeptides (polymyxins). The mechanism and spectrum of action, indications for use, route of administration, side effects.
37. Antibiotics from the group of lincosamides. Mechanism and spectrum of action, indications for use, routes of administration, side effects.
38. Classification of drugs used to treat tuberculosis.
39. Pharmacokinetics, pharmacodynamics of derivatives of isonicotinic acid hydrazide, in particular isoniazid. Side effects that occur with prolonged use and ways to prevent them.
40. Pharmacological characteristics of rifampicin. Features of long-term use.
41. Antibiotic drugs in the treatment of tuberculosis.
42. Pharmacology of anti-TB drugs of various chemical groups. Side effects.
43. Antiviral drugs. Classification.
44. Pharmacology of drugs prescribed for patients with influenza. Features of their practical application.
45. Medicines used for herpes infection.
46. The possibilities of using of antiviral agents in the complex treatment of AIDS patients.
47. Classification of antisyphilitic drugs.
48. General characteristics of antisyphilitic drugs
49. Features of the use of antibiotics, bismuth preparations in the treatment of syphilis.
50. Classification of antiprotozoal drugs.
51. Antimalarial medicines. Basic principles for the prevention and treatment of malaria. Classification of antimalarial drugs. Mechanism of action.
52. Drug therapy for malaria coma.
53. Medicines used to treat trichomoniasis. Pharmacokinetics, pharmacodynamics of metronidazole. Indications for use and side effects.
54. Medicines for the treatment of chlamydia patients.
55. Classification of anti-amoebic drugs. Pharmacological characteristics of drugs.
56. Medicines for the treatment of patients with giardiasis.
57. Medicines used to treat patients with toxoplasmosis.
58. Anthelmintic (anthelmintic) drugs. Classification of anthelmintic drugs. Features of application for various types of helminthiasis.
59. Pharmacological characteristics of agents used to treat intestinal helminthiasis.
60. Medicines used for extraintestinal helminthiasis.

Content module 8. Preparations of macro- and microelements. Enzyme and antienzyme preparations. Plasma substitutes and preparations for parenteral nutrition. Medicines used for the treatment and prevention of diseases of dental hard tissues, tooth pulp and periodontal tissue. Drugs that affect the metabolism of bone and cartilage. Antidotes.

1. Preparations of acids, alkalis. Local and resorptive action of acids and alkalis. Indications for use. Acid and alkali preparations. Acute poisoning by acids and alkalis. Assistance measures.
2. Classification preparations of alkali and alkaline earth metals.
3. Sodium preparations. Pharmacological and indications for use.
4. Potassium preparations. Pharmacodynamics, indications for use.
5. Magnesium preparations. Pharmacokinetics, pharmacodynamics. The dependence of the effect on the route of administration. Indications for use.
6. Calcium preparations. Pharmacological effects, indications for use, route of administration.
7. Preparations for the treatment and prevention of osteoporosis.
8. Pharmacology of pulp devitalization agents.
9. Pharmacology of the treatment of periodontal and dental pulp diseases.
10. Classification and general characteristics of plasma substitutes. Indications for use.
11. Preparations for parenteral nutrition.
12. Classification of enzyme preparations.
13. The mechanism of action and indications for the use of peptidases, proteases, nucleases, hyaluronidase preparations. General description of enzyme Inhibitors.
14. The basic principles of pharmacotherapy of acute emergency conditions.
15. Drugs for the treatment of emergency conditions, principles of their purpose and routes of administration.
16. Pharmacology of pain relief drugs.
17. Pharmacology of drugs to stop bleeding after tooth extraction.
18. Pharmacological kit of the dentist.
19. Causes of acute poisoning.
20. Symptoms of acute poisoning with drugs of various pharmacological groups.
21. Methods of active detoxification.
22. The concept of antidotes. Types of antidote therapy.
23. Pharmacology of antidote drugs.
24. Principles of symptomatic treatment of acute poisonings.

The list of practical skills required for the final module control and semester final assessment

1. Be able to compose and write prescriptions.
2. To be able to make calculations of concentrations of drugs based on a single dose for adults and children of different ages.
3. To be able to prescribe different dosage forms in prescriptions.
4. To be able to prescribe drugs in prescriptions for the corresponding pathological conditions in adults and children based on the characteristics of the pharmacodynamics and pharmacokinetics of drugs.
5. To be able to write prescriptions for medicines that are widely used in therapy and pediatrics and emergency care.
6. To be able to predict the dependence of the action of drugs on the individual characteristics of the body of adults and children.
7. Be able to conduct a pharmacological experiment.

The form of final control of academic performance - exam

The system of continuous and final control

When assessing the mastery of each module topic, student is graded by a 4-point (traditional) scale using developed standardized generalized criteria for assessing student knowledge for the discipline. This takes into account all types of work provided by the guidelines for the study of topics.

Table 1. Standardized generalized criteria for grading the knowledge of higher education

students in PSMU

A 4-point scale	Grades in ECTS	Grades criteria
5 (outstanding)	A	Student shows special creative abilities, is able to acquire knowledge independently, finds and processes necessary information, is able to use the acquired knowledge and skills for making decisions in unusual situations, makes convincing answers, independently reveals own talents and inclinations, possesses not less than 90% of knowledge on the topic both during the survey and all types of control.
4 (good)	B	Student speaks fluently in the studied amount of material, applies it in practice, freely solves exercises and problems in standardized situations, and independently corrects errors, the number of which is insignificant, has at least 85% knowledge of the topic both during survey and during all types of control.
	C	Student is able to compare, summarize and systematize information under the guidance of a researcher, independently applies it in practice, to control their own activities; corrects mistakes, chooses arguments to confirm opinions, has at least 75% knowledge of the topic both during survey and all types of control.
3 (pass)	D	Student reproduces a significant part of theoretical material, shows knowledge and understanding of basic provisions with the help of a teacher, and can analyze educational material. The student knows how to correct mistakes and has at least 65% knowledge of the topic both during the survey and during all types of control.
	E	Student has the educational material at a level higher than initial, a significant part of it reproduces at the reproductive level, has at least 60% knowledge of the topic both during survey and all types of control.
2 (insufficient)	FX	Student knows material at the level of individual fragments that make up a small part of the material, has less than 60% knowledge of the topic both during survey and all types of control.
	F	Student knows material at the level of elementary recognition and reproduction of individual facts, elements, has less than 60% knowledge of the topic both during survey and all types of control.

Grades conversion by traditional 4-point scale into multi-point (maximum score – 120 points) - conversion of total grade for the module – is carried out only after the final lesson, which precedes a final certification. Conversion is performed according to the following algorithm (table 2):

- calculates the average student's grade by traditional 4-point scale, obtained during the final classes which belongs to this module (up to 0,01);
- to obtain a converted multi-point total grade for the module, the average grade obtained by traditional 4-point scale must be multiplied by a factor of 24. Exceptions are cases where the average score by traditional 4-point scale is 2. In this case, the student receives 0 points accordantly to multi-point scale;
- average grade is calculated on the total number of classes in the module, and not on the actual number of students attended.

The minimum convertible sum of grades for the module is 72 points.

Retake of unsatisfactory grade takes place at the department; the number of attempts is not limited. Retake of unsatisfactory grades begins two weeks before the end of semester and is carried

out if the student's average score from the module is less than 3.0.

Table №2. Unified table of grades, FMC grades, examination, and the traditional 4-point grades accordance

Average grade (A)	Average grade on module (A* 24)	FMC grade (A*16)	Grades for module/exam (A*24 + A*16)	ECTS category	4-point scale
2	48	32	80	**F FX**	**2 insufficient**
2,1	50	34	84		
2,15	52	34	86		
2,2	53	35	88		
2,25	54	36	90		
2,3	55	37	92		
2,35	56	38	94		
2,4	58	38	96		
2,45	59	39	98		
2,5	60	40	100		
2,55	61	41	102		
2,6	62	42	104		
2,65	64	42	106		
2,7	65	43	108		
2,75	66	44	110		
2,8	67	45	112		
2,85	68	46	114		
2,9	70	46	116		
2,95	71	47	118		
3	72	50	122	**E**	**3 pass**
3,05	73	50	123		
3,1	74	50	124		
3,15	76	50	126		
3,2	77	51	128		
3,25	78	52	130	**D**	
3,3	79	53	132		
3,35	80	54	134		
3,4	82	54	136		
3,45	83	55	138		
3,5	84	56	140		
3,55	85	57	142		**4 good**
3,6	86	58	144	**C**	
3,65	88	58	146		
3,7	89	59	148		
3,75	90	60	150		
3,8	91	61	152		

3,85	92	62	154		
3,9	94	62	156		
3,95	95	63	158		
4	96	64	160	**B**	
4,05	97	65	162		
4,1	98	66	164		
4,15	100	66	166		
4,2	101	67	168		
4,25	102	68	170		
4,3	103	69	172		
4,35	104	70	174		
4,4	106	70	176		
4,45	107	71	178		
4,5	108	72	180	**A**	**5 outstanding**
4,55	109	73	182		
4,6	110	74	184		
4,65	112	74	186		
4,7	113	75	188		
4,75	114	76	190		
4,8	115	77	192		
4,85	116	78	194		
4,9	118	78	196		
4,95	119	79	198		
5	120	80	200		

Semester final certification (examination) is carried out in one day in two stages: computer testing and theoretical component. At first stage, on the day of exam in the department computer class, students are tested on 20 questions (in 20 minutes) from the academic base of KTE-1. Each correct answer for the test task is counted as 1 point (maximum - 20 points). The result of the computer control is not a reason for not admitting him to the theoretical part of the exam. The control of theoretical and practical training is carried out by verbal answer to the examination ticket. Each question of the examination ticket is assessed within 0-20 points.

Based on the computer control and the theoretical part of the exam, the student is given a total score from 0 to 80 points; the conversion of points into the traditional score is not realized.

Control of theoretical and practical training of the student during the semester final certification is carried out according to the following regulations:

1. Computer test control (20 tests – 20 points).

2. Answer to three theoretical questions with pharmacotherapeutic tasks – 20 points each answer.

Student has the right to retake the exam only 2 times and only during the examination session. The result of the student's exam is recorded in the «Statement of student achievement in the discipline». This document is sealed with the signatures of the examiner and the head of the department.

Students who during the study of module acquired an average grade from 4.50 to 5.0 are exempt from FMC (final module control) and exam and automatically (by agreement) receive a final grade according to the table 2 considering mandatory presence of the student at FMC and exam. In case of disagreement with the assessment, the specified category of students are passing FMC and

exam according to the general rules.

A student who has successfully passed all the final module tests during the study of the discipline has the right to increase the grade on the traditional 4-point scale and ECTS grade only with the permission of the rector or first vice-rector only in the final year of studying.

Teaching methods

- verbal (lecture, explanation, storytelling, conversation, instruction);
- visual (observation, illustration, demonstration);
- practical (thematic discussions, brainstorming, «round table», analysis of specific situations (case method), presentations).

Control methods

- verbal control;
- written control;
- test control;
- programmable control;
- practical verification;
- self-control;
- self-esteem.

Types of control:

- preliminary (output);
- current;
- exam

Methodological support

1. Working program of the discipline.
2. Thematic plans of lectures, practical classes and independent work of students.
3. Syllabus.
4. Methodical development of lectures.
5. Methodical recommendations for teachers to conduct classes.
6. Multimedia presentations, slides.
7. Packages of tests, pharmacotherapeutic tasks and situational tasks.
8. The educational literature used in the study of the discipline.
9. Computer programs filled with test tasks from licensed tests Step 1.
10. Tables, drug collections, stands, display cabinets, materials and equipment for pharmacological experiments.

Recommended reading

Basic (available at the library of PSMU)

1.Pharmacology: textbook for English-speaking students of higher medical educational institutions [of the 4th level of accreditation with English as the language of instruction] / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina. – 4th ed., updat. – Vinnytsia: Nova Knyha, 2018. – 551 p.

2. Pharmacology: textbook / V. Bobyrov, O. Vazhnicha, T. Devyatkina, N. Devyatkina. - 5-е вид. оновл. та перероб. – Вінниця: Нова Книга, 2020. – 560 с: il.

Supplementary

1. Germanyuk, T. A. Modern classifications of the essential drugs : tutorial / T. A. Germanyuk, V. P. Bobruk, S. I. Tykholaz; National Pirogov Memorial Medical University (Vinnytsya). – Vinnytsia : TVORY, 2021. – 112 p.

2. Golan, D. Principles of Pharmacology : the Pathophysiologic Basis of Drug Therapy / D. E. Golan, E. J. Armstrong, A. W. Armstrong. – 4th ed. – Philadelphia [etc.] : Wolters Kluwer, 2017. – XIX, 1020 p.

3. Goodman and Gilman's the Pharmacological Basis of Therapeutics / eds.: L. L. Brunton, R. Hilal-Dandan, B. C. Knollmann. – 13th ed. – New York [etc.] : McGraw-Hill Education, 2018. – XIII, 1419 p.

4. Mosby's Dental Drug Reference / ed. A. H. Jeske. – 12th ed. – Philadelphia : Elsevier, 2018. – XVI, 1494 p.

5. USMLE. Step 1. 2018. Pharmacology: lecture notes / ed.: C. Davis, S. R. Harris; contributor: L. Kerecsen, B. R. Krishna. – New York: Kaplan Medical, 2018. – 321 p.

Information resources

1.Basic Pharmacokinetics and Pharmacodynamics: An Integrated Textbook and Computer Simulations
http://surl.li/cobkm

2.Lippincott Illustrated Reviews: Pharmacology Karen Whalen
http://surl.li/cvjls

3.Pharmacokinetics and Adverse Effects of Drugs
http://surl.li/cobjp

4.Antihypertensive drug
https://en.wikipedia.org/wiki/Antihypertensive_drug

5.Pharmacology Anticoagulants & Antiplatelet blood thinners explained clearly by Mike Linares from
http://homedesigningersing.com/

6.Antimicrobial drugs
http://surl.li/cvjly

Developers
Head, Doctor of Medical Sciences, Professor Ruslan LUTSENKO
Candidate of Medical Sciences, Associate Professor Antonina SYDORENKO
Candidate of Medical Sciences, Associate Professor Yuri KAPUSTNIK