MINISTRY OF EDUCATION AND SCIENCE OF RUSSIA

Federal State Budgetary Educational Institution of higher education
«I.N. Ulianov Chuvash State University»
(FSBEI of HE «I.N. Ulianov Chuvash State University»)

Medical Faculty

Department of Pharmacology, Clinical Pharmacology and Biochemistry

«APPROVE»
Vice-rector for Academic Affairs
_____ I.E. Poverinov
«13» 04 2022

Working programs of the discipline (module) «Фармакология / Pharmacology»

Direction of training / specialty 31.05.03 Стоматология / Dentistry
Graduate's qualification Врач-стоматолог / Dental Practitioner

Direction (profile) / specialization «Dentistry»

Form of training – очная / intramural
Course – 3
Term – 5
Total academic hours/credit points – 144/4
The year of beginning the training – 2022

Cheboksary - 2022

The fundamental document for compiling the working program of the discipline (module) Федеральный государственный образовательный стандарт высшего образования – специалитет по специальности 31.05.03 Стоматология (приказ Минобрнауки России от 12.08.2020 г. № 984)

Approved by:
Head of the department, doctor of medical sciences S.I. Pavlova
Assistant O.V. Lebedev

The working program was approved at the meeting of the Department of Pharmacology, Clinical Pharmacology and Biochemistry,
24.03.2022, protocol № 8
Head of the department S.I. Pavlova

Approved by
Dean of the Medical Faculty V.N. Diomidova
Acting Head of the Educational and Methodological Department E.A. Shirmanova

1. The purpose and objectives of training in the discipline (module)

The purpose of the discipline - 1) Mastering knowledge in general and private pharmacology;

2) The ability to analyze the effect of drugs on the basis of their pharmacological effects;

3) The ability to assess the possibility of using drugs for the treatment and prevention of various diseases and pathological conditions in medical practice.

The objectives of the discipline - 1) formation of modern ideas about the fundamentals of pharmacodynamics and pharmacokinetics of drugs;

2) formation of a system of knowledge about the decisive importance of pharmacodynamics and pharmacokinetics of drugs in the correction of pathological processes;

3) study of the mechanisms of action of various groups of drugs, their pharmacological effects, indications and contraindications for use;

4) the formation of students' skills in writing prescriptions for medicines;

5) formation of skills in studying scientific literature and official statistical reviews;

6) formation of skills in using electronic library systems and databases containing pharmacological information.

2. The place of practical training in the structure of the educational program of higher education

The discipline «Фармакология / Pharmacology» относится к обязательной части учебного плана refers to the mandatory part in the curriculum of the educational program of higher education (hereinafter referred to as the EP of HE) in the field of training / specialty 31.05.03 Стоматология, direction (profile) / specialization of the program «Dentistry».

Previous academic disciplines (modules) and (or) practices that form the knowledge, skills and abilities necessary for training in the discipline (module):

Knowledge, skills and abilities formed as a result of training in a discipline (module) are necessary when teaching in the following disciplines (modules) and (or) practices:

3. Planned learning outcomes in the discipline (module), correlated with the planned learning outcomes

Planned learning outcomes in the discipline (module), correlated with the planned learning outcomes

Code and name of the competence	Code and name of the competence achievement	Descriptors for the indicator of competence achievement (learning)
ОПК-6 Способен назначать, осуществлять контроль эффективности и безопасности немедикаментозного и медикаментозного лечения при решении профессиональных задач / He/she is able to prescribe, monitor the effectiveness and safety of non-drug and pharmacological therapy in solving professional problems	ОПК-6.1 Способен определить показания и противопоказания при назначении медикаментозного, немедикаметозного и иных методов лечения / He/she is able to determine the indications and contraindications when prescribing medication, non-drug and other methods of treatment	Know: 1. rules for writing prescriptions for basic dosage forms; 2. dosage forms, routes of drug administration, types of their action and interaction; 3. main drug groups and pharmacotherapeutic actions of drugs by groups; 4. side effects, types of reactions and complications of drug therapy. Be able to: 1. write out dosage forms in the form of a prescription using reference literature; 2. find information about medicines in accessible databases, electronic library systems, use search engines; 3. navigate the nomenclature of medicines; 4. analyze the effect of drugs in terms of the totality of their pharmacological properties; 5. evaluate the possibilities of using medicines for the treatment, rehabilitation and prevention of diseases and pathological conditions; Possess: skills of working with traditional and electronic sources of pharmacological information; the conceptual apparatus of the discipline.
ОПК-6 Способен назначать, осуществлять контроль эффективности и безопасности немедикаментозного и медикаментозного лечения при решении профессиональных задач / He/she is able to prescribe, monitor the effectiveness and safety of non-drug and pharmacological therapy in solving professional	ОПК-6.2 Способен оценить риски связанные с использованием медикаментозного, немедикаметозного и иных методов лечения / He/she is able to assess the risks associated with the use of medicamentous therapy, drug-free modalities and other methods of treatment	Know: 1. rules for writing prescriptions for basic dosage forms; 2. dosage forms, routes of drug administration, types of their action and interaction; 3. main drug groups and pharmacotherapeutic actions of drugs by groups; 4. side effects, types of reactions and complications of drug therapy. Be able to:

problems		1. write out dosage forms in the form of a prescription using reference literature; 2. find information about medicines in accessible databases, electronic library systems, use search engines; 3. navigate the nomenclature of medicines; 4. analyze the effect of drugs in terms of the totality of their pharmacological properties; 5. evaluate the possibilities of using medicines for the treatment, rehabilitation and prevention of diseases and pathological conditions; Possess: skills of working with traditional and electronic sources of pharmacological information; the conceptual apparatus of the discipline.
ОПК-6 Способен назначать, осуществлять контроль эффективности и безопасности немедикаментозного и медикаментозного лечения при решении профессиональных задач / He/she is able to prescribe, monitor the effectiveness and safety of non-drug and pharmacological therapy in solving professional problems	ОПК-6.3 Способен оценить эффективность медикаментозного, немедикаметозного и иных методов лечения / He/she is able to assess the effectiveness of pharmacological therapy, non-drug and other methods of treatment	Know: 1. rules for writing prescriptions for basic dosage forms; 2. dosage forms, routes of drug administration, types of their action and interaction; 3. main drug groups and pharmacotherapeutic actions of drugs by groups; 4. side effects, types of reactions and complications of drug therapy. Be able to: 1. write out dosage forms in the form of a prescription using reference literature; 2. find information about medicines in accessible databases, electronic library systems, use search engines; 3. navigate the nomenclature of medicines; 4. analyze the effect of drugs in terms of the totality of their pharmacological properties; 5. evaluate the possibilities of using medicines for the treatment, rehabilitation and prevention of diseases and pathological conditions;

		Possess: skills of working with traditional and electronic sources of pharmacological information; the conceptual apparatus of the discipline.
ПК-2 Способен назначить, контролировать эффективность и безопасность немедикаментозного и медикаментозного лечения / He/she is able to prescribe, monitor the effectiveness and safety of non-drug and pharmaceutical treatment	ПК-2.1 Способен разработать план лечения, назначить лекарственные препараты, немедикаментозное лечение, медицинские изделия в соответствии с действующими порядками оказания медицинской помощи, клиническими рекомендациями (протоколами лечения) по вопросам оказания медицинской помощи с учетом стандартов медицинской помощи / He/she is able to develop a treatment plan, prescribe medications, non-drug treatment, medical devices in accordance with current procedures for providing medical care, clinical recommendations (treatment protocols) on the issues of providing medical care, taking into account the standards of medical care	Know: 1. rules for writing prescriptions for basic dosage forms; 2. dosage forms, routes of drug administration, types of their action and interaction; 3. main drug groups and pharmacotherapeutic actions of drugs by groups; 4. side effects, types of reactions and complications of drug therapy. Be able to: 1. write out dosage forms in the form of a prescription using reference literature; 2. find information about medicines in accessible databases, electronic library systems, use search engines; 3. navigate the nomenclature of medicines; 4. analyze the effect of drugs in terms of the totality of their pharmacological properties; 5. evaluate the possibilities of using medicines for the treatment, rehabilitation and prevention of diseases and pathological conditions; Possess: skills of working with traditional and electronic sources of pharmacological information; the conceptual apparatus of the discipline.
ПК-2 Способен назначить, контролировать эффективность и безопасность немедикаментозного и медикаментозного лечения / He/she is able to prescribe, monitor the effectiveness and safety of non-drug and pharmaceutical treatment	ПК-2.2 Способен контролировать эффективность и безопасность назначенного лечения, при необходимости корректировать его в соответствии с действующими порядками оказания медицинской помощи,	Know: 1. rules for writing prescriptions for basic dosage forms; 2. dosage forms, routes of drug administration, types of their action and interaction; 3. main drug groups and pharmacotherapeutic actions of drugs by groups; 4. side effects, types of reactions and complications of drug

	клиническими рекомендациями (протоколами лечения) по вопросам оказания медицинской помощи с учетом стандартов медицинской помощи / He/she is able to monitor the effectiveness and safety of the prescribed treatment, if necessary, adjust it in accordance with current procedures for providing medical care, clinical recommendations (treatment protocols) on providing medical care, taking into account the standards of medical care	therapy. Be able to: 1. write out dosage forms in the form of a prescription using reference literature; 2. find information about medicines in accessible databases, electronic library systems, use search engines; 3. navigate the nomenclature of medicines; 4. analyze the effect of drugs in terms of the totality of their pharmacological properties; 5. evaluate the possibilities of using medicines for the treatment, rehabilitation and prevention of diseases and pathological conditions; Possess: skills of working with traditional and electronic sources of pharmacological information; the conceptual apparatus of the discipline.

4. Structure, scope and content of the discipline (module)

Educational activities in the discipline (module) are carried out:

- in the form of students' face-to-face work with the teaching staff of the organization and (or) persons involved by the organization to implement the educational programs on other terms (hereinafter - contact work);

- in the form of students' independent work.

Face-to-face work can be classroom-based, extramural, as well as it can be conducted in an electronic information and educational environment (EIEE).

Learning sessions in the discipline (module) and interim assessment of students are conducted in the form of face-to-face work and in the form of students' independent work.

During learning sessions in the discipline (module) face-to-face work includes: lecture -type classes, seminar-type classes and (or) group consultations, and (or) individual work of students with the teaching staff of the organization and (or) persons involved by the organization to implement the educational programs on other terms (including individual consultations).

Legend:

Lec – lectures, Lab – laboratory work, Pr – practical classes, ICW – individual face-to -face work, IW – independent work.

4.1. Content of the discipline (module)

Section name	The section's content	Formed competences	Competence achievement indicator
General pharmacology	General recipe.	ОПК-6, ПК-2	ОПК-6.1, ОПК-6.2, ОПК-6.3, ПК-2.1, ПК-2.2

General pharmacology	General pharmacology: pharmacokinetics and pharmacodynamics.	ОПК-6, ПК-2	ОПК-6.1, ОПК-6.2, ОПК-6.3, ПК-2.1, ПК-2.2
Particular pharmacology	Vegetotropic agents.		
	Sedative-hypnotics. Anxiolytics. Anticonvulsants and antiparkinsonian drugs.		
	Psychotropic drugs: antipsychotics, antidepressants, mood stabilizers, psychostimulants, neurometabolic drugs (nootropics).		
	Analgesics. General and local anesthetics.		
	Anti-inflammatory, immunotropic and anti-allergic agents.		
	Hormone preparations. Hormonal and non-hormonal antidiabetic agents.		
	Drugs affecting the functions of the gastrointestinal tract and respiratory organs		
	Antiarrhythmic drugs. cardiac glycosides. Non-glycoside cardiotonic drugs. Antianginal and hypolipidemic agents.		
	Antihypertensive and diuretic agents.		
	Фармакологическая регуляция агрегатного состояния крови.		
	Antibiotics and chemotherapeutic agents.		
Final control work	Exam		

4.2. Scope of the discipline and types of academic work

Forms of control and types of academic work		Labor intensity of the discipline (module)	
		5	total
1. Face-to-face work:		80,3	80,3
In-class learning in total, including:		80	80
Лекционные занятия (Лек)		32	32,3
Лабораторные занятия (Лаб)		48	48
Индивидуальная контактная работа (ИКР)		0,3	
2. Independent work of the student:		27,7	27,7
3. Intermediate certification (exam) (экзамен)		Эк	Эк
Total:	academic hours	144	144
	credit units	4	4

№ item	The section's (theme's) name	Face-to face work, including in the electronic information and educational environment, academic hours				IW, academic hours	Total, academic hours
		Lect.	Pr.	Lab.	ICW		
	General pharmacology						
1	General recipe.			2		3,7	5,7
2	General pharmacology: pharmacokinetics and pharmacodynamics.	4		2			6
	Particular pharmacology						
3	Vegetotropic agents.	4		6			10
4	Sedative-hypnotics. Anxiolytics. Anticonvulsants and antiparkinsonian drugs.	2		3			5
5	Psychotropic drugs: antipsychotics, antidepressants, mood stabilizers, psychostimulants, neurometabolic drugs (nootropics).			3			3
6	Analgesics. General and local anesthetics.	4		6			10

7	Anti-inflammatory, immunotropic and anti-allergic agents.	2		2			4
8	Hormone preparations. Hormonal and non-hormonal antidiabetic agents.					5	5
9	Drugs affecting the functions of the gastrointestinal tract and respiratory organs	2		3			5
10	Antiarrhythmic drugs. cardiac glycosides. Non-glycoside cardiotonic drugs. Antianginal and hypolipidemic agents.	4		6		4	14
11	Antihypertensive and diuretic agents.	4		3		5	12
12	Фармакологическая регуляция агрегатного состояния крови.			3		5	8
13	Antibiotics and chemotherapeutic agents.	6		9		5	20
	Final control work						
14	Exam	0,3					0,3
Total academic hours		32,3		48		27,7	144

4.3. Summary of the discipline (module), structured by sections (topics)

Раздел 1. General pharmacology

Тема 1. General recipe.

Лабораторное занятие. Laboratory lesson 1. General recipe. Solid and soft dosage forms

Design and calculation of medical prescription. Prescription prescriptions for solid and soft dosage forms. The structure of the prescription, the rules for prescribing tablets, dragees, powders for internal and external use, ointments, pastes, liniments, suppositories.

Liquid dosage forms.

The structure of the recipe, the rules for prescribing solutions for internal, external and parenteral use, infusions, decoctions, tinctures, extracts, emulsions.

Тема 2. General pharmacology: pharmacokinetics and pharmacodynamics.

Лекционное занятие. Lecture 1. Introduction to the discipline. General pharmacology.

Pharmacology as a science. History of pharmacology. Stages of pharmacological research. Principles of drug nomenclature.

Lecture 2. Main issues of pharmacodynamics. Mechanisms of action of medicinal substances (PM), “targets” with which drugs interact (action on specific receptors, effect on enzyme activity, physicochemical effect on cell membranes, chemical interaction). Pharmacological reception, methods of signal transmission from receptors, the concept of agonists and antagonists. Pharmacological effects (main, side, toxic). Types of action of drugs (drugs). Types of pharmacotherapy.

Fundamentals of pharmacokinetics. Routes of drug administration and their

comparative characteristics, types of drug transport through biological membranes. Parameters of drugs that determine transport through biological membranes. Influence of physical and chemical properties of drugs, pH of the biological environment on the degree of ionization, absorption, distribution and elimination of drugs. Practical application of the Henderson-Hasselbalch equation. Properties of biological membranes that determine the rate of transport.

Лабораторное занятие. Laboratory lesson 2. General pharmacology: pharmacodynamics.

Basic questions of pharmacodynamics. Mechanisms of action of medicinal substances (PM), "targets" with which drugs interact (action on specific receptors, effect on enzyme activity, physicochemical effect on cell membranes, chemical interaction). Pharmacological reception, methods of signal transmission from receptors, the concept of agonists and antagonists. Pharmacological effects (main, side, toxic). Types of action of drugs (drugs). Types of pharmacotherapy.

General pharmacology: pharmacokinetics. Fundamentals of pharmacokinetics. Routes of drug administration and their comparative characteristics, types of drug transport through biological membranes. Parameters of drugs that determine transport through biological membranes. Influence of physical and chemical properties of drugs, pH of the biological environment on the degree of ionization, absorption, distribution and elimination of drugs. Practical application of the Henderson-Hasselbalch equation. Properties of biological membranes that determine the rate of transport.

General pharmacology: factors influencing pharmacokinetics and pharmacodynamics.

Factors that determine the absorption, distribution, metabolism and excretion of drugs in the body. Influence of gender, age, pathological state of the body and genetic factors on pharmacodynamics, pharmacokinetics and dosing of drugs.

Раздел 2. Particular pharmacology

Тема 3. Vegetotropic agents.

Лекционное занятие. Lecture 3. Cholinergic drugs.

The structure of the autonomic nervous system. The role of mediators in signal transmission. Features of the parasympathetic system. Structure, localization and functions of cholinergic receptors. Classification, mechanisms of action, pharmacological properties, indications and contraindications for the use of cholinomimetics and anticholinergics.

Lecture 4. Adrenergic drugs.

Features of the structure of the sympathetic nervous system. Structure, localization and functions of adrenergic receptors. Classification, mechanisms of action, pharmacological properties, indications and contraindications for the use of adrenomimetics and blockers.

Лабораторное занятие. Laboratory lesson 3. M- and M, N-cholinomimetics. Synthesis and enzymatic inactivation of acetylcholine, acetylcholine - and butyrylcholinesterase, Classification of M-cholinergic receptors: M1 - M5 subtypes, their localization and functions. Transport of cholinergic ligands across biological membranes. Direct M- and M,N-cholinomimetic. Cholinesterase blockers as pharmacological agents, spectrum of action, side and toxic effects. Antidotes for poisoning with organophosphorus agents.

Laboratory lesson 4. M-anticholinergics. Features of pharmacodynamics of M-anticholinergic drugs. Classification. Side effects. Indications for use in clinical practice. Antidotes for poisoning with anticholinergic substances.

Laboratory lesson 5. N-anticholinergics. Features of pharmacodynamics of N- cholinergic drugs. Ganglioblockers. Peripheral muscle relaxants. Classification. Side effects. Indications for use in clinical practice.

Adrenomimetics. Mediation in postganglionic neurons of the sympathetic system. Hormonal component of the sympathetic-adrenal system (adrenaline). Features of pharmacodynamics and pharmacokinetics of adrenomimetics. Classification, main and side pharmacological effects. Indications for use in clinical practice.

Тема 4. Sedative-hypnotics. Anxiolytics. Anticonvulsants and antiparkinsonian drugs.

Лекционное занятие. Lecture 5. Sedative-hypnotics.

Phase structure of sleep. Neurotransmitters of the sleep-wake cycle. Problems of tolerance and drug dependence when using sedative-hypnotic drugs. The role of GABA in the functions of the central nervous system. GABA A and GABA B receptors. The concept of the GABA-receptor complex. Metabolism of GABA, participation in it of pyridoxine, transaminases. Classification of sedative-hypnotic drugs. Mechanism of action. Indications for use. Side effects. Contraindications.

Лабораторное занятие. Laboratory lesson 6. Sedative-hypnotic drugs. Anxiolytics.

Features of pharmacodynamics and pharmacokinetics and classification of sedative-hypnotic and anxiolytic drugs. Mechanisms of action. Indications for use. Side effects. Contraindications.

Тема 5. Psychotropic drugs: antipsychotics, antidepressants, mood stabilizers, psychostimulants, neurometabolic drugs (nootropics).

Лабораторное занятие. Laboratory lesson 7. Antipsychotics.

Dopamine, muscarinic, histamine and adrenoreceptors and their role in the action of neuroleptics. Typical neuroleptics. Atypical neuroleptics. Features of the action of atypical neuroleptics. Side effects of antipsychotics. Extrapyramidal symptoms, hyperglycemia, hyperlipidemia, weight gain, hyperprolactinemia, atropine-like effects Prevention and management of side effects. Malignant neuroleptic syndrome.

Psychotropic drugs: Antipsychotic drugs. Normotimics.

Features of pharmacodynamics of typical and atypical antipsychotics. Side effects of antipsychotics. Application in clinical practice. lithium preparations. The need to monitor plasma concentrations, treatment of intoxications. Peripheral effects of lithium salts: influence on the concentration function of the kidneys, stimulation of the granulocytic germ, decrease in iodination of tyrosine, the risk of hypothyroidism and overgrowth of the thyroid gland. Alternative drugs to lithium in TIR. Psychotropic drugs: antidepressants, psychostimulants, nootropics.

Sedating, stimulating and balanced antidepressants. "Cheese syndrome", foods that are not compatible with the intake of MAO inhibitors. "Serotonin Syndrome". Monoamine reuptake inhibitors. MAO inhibitors. Atypical antidepressants. Compatibility of antidepressants with other pharmacological and nutritional factors, at the beginning of the therapeutic effect, additional effects. Psychostimulants and nootropics. Classification. Mechanism of action. Indications for use. Side effects. Contraindications.

Тема 6. Analgesics. General and local anesthetics.

Лекционное занятие. Lecture 6, 7. Opioid and non-opioid analgesics. Opiate receptors, their ligands and functional role. The mechanism of analgesic action of opioid receptor agonists and other groups of drugs. General and local anesthetics Classification. Mechanism of action. Indications for use. Side effects. Contraindications.

Лабораторное занятие. Laboratory lesson 8. Analgesics. Anatomy and physiology of the pain perception system. Opioid and non-opioid analgesics. Opiate receptors, their ligands and functional role. The mechanism of analgesic action of opioid receptor agonists and other groups of drugs. Nonnociceptive effects of opioids.

Laboratory lesson 9. General and local anesthetics Classification. Mechanism of action. Indications for use. Side effects. Contraindications.

Тема 7. Anti-inflammatory, immunotropic and anti-allergic agents.

Лекционное занятие. Lecture 8. Anti-inflammatory drugs.

The concept of autacoids involved in the inflammatory response. Metabolism of eicosatetraenoic (arachidonic) acid, the concept of prostanoids and leukotrienes. Con-stuitive and inducible cyclooxygenases (COX). Non-steroidal and steroidal anti-inflammatory drugs: features of pharmacodynamics, classification, use in clinical practice, side effects.

Лабораторное занятие. Laboratory lesson 10. Anti-inflammatory drugs. The concept of autacoids involved in the inflammatory response. Metabolism of eicosatetraenoic (arachidonic) acid, the concept of prostanoids and leukotrienes. Constructive and inducible cyclooxygenases (COX). Non-steroidal and steroidal anti-inflammatory drugs: features of pharmacodynamics, classification, use in clinical practice, side effects.

Immunotropic and antiallergic drugs.

Basic immunotropic drugs. Classification. Mechanism of action. Indications for use. Side effects. Contraindications. Intravenous immunoglobulins as drugs with immunosuppressive and immunostimulating mechanisms of action. The use of normal human immunoglobulin in the treatment of autoimmune pathology and as replacement factors in immunodeficiency.

Тема 9. Drugs affecting the functions of the gastrointestinal tract and respiratory organs

Лекционное занятие. Lecture 9. Drugs that affect the functions of the respiratory system.

Classification of drugs that affect the function of the respiratory system. Pharmacological characteristics of drugs used in bronchial obstructive syndrome. Agonists of β2-adrenergic receptors. M-anticholinergics. Derivatives of methylxanthine. inhaled glucocorticoids. Mast cell membrane stabilizers. Leukotriene receptor blockers. Monoclonal antibodies to IgE. Devices for inhalation: Typical complications when using β-agonists, methylxanthines and glucocorticoid drugs in patients with bronchial asthma. Drugs used in pulmonary hypertension. Mucolytics and expectorants, substances of direct and reflex action. Antitussives (central and peripheral action). Means used in respiratory distress syndrome.

Pharmacology of drugs used to treat peptic ulcer. Principles of etiotropic and pathogenetic therapy. Principles of regulation of hydrochloric acid secretion. The role of histamine, gastrin, acetylcholine, somatostatin, prostaglandins in the regulation of hydrochloric acid secretion. Antisecretors. Classification according to the mechanism of antisecretory action. Absorbable (resorptive) and non-absorbable (non-resorptive) antacids: mechanisms of action, side effects, composition of combined antacids. Gastroprotectors. Mechanisms of action, contraindications and side effects. Antiemetics. Differences in the mechanisms of action, applications for vomiting of various origins (kinetosis, vomiting during toxicosis of pregnancy, postoperative period, radiation sickness, antitumor chemotherapy, etc.). Classification of laxatives. Features of the mechanism of action of lactulose and indications for use.

Лабораторное занятие. Laboratory lesson 11. Drugs that affect the functions of the respiratory system.

Classification of drugs that affect the function of the respiratory system. Pharmacological characteristics of drugs used in bronchial obstructive syndrome. Agonists of β2-adrenergic receptors. M-anticholinergics. Derivatives of methylxanthine. inhaled glucocorticoids. Mast cell membrane stabilizers. Leukotriene receptor blockers. Monoclonal antibodies to IgE. Devices for inhalation: Typical complications when using β-agonists, methylxanthines and glucocorticoid drugs in patients with bronchial asthma.

Drugs that affect the functions of the digestive tract.

Pharmacology of drugs used to treat peptic ulcer. Principles of etiotropic and pathogenetic therapy. Principles of regulation of hydrochloric acid secretion. The role of histamine, gastrin, acetylcholine, somatostatin, prostaglandins in the regulation of hydrochloric acid secretion. Antisecretors. Classification according to the mechanism of antisecretory action. Absorbable (resorptive) and non-absorbable (non-resorptive) antacids: mechanisms of action, side effects, composition of combined antacids. Gastroprotectors. Mechanisms of action, contraindications and side effects. Antiemetics. Differences in the mechanisms of action, applications for vomiting of various origins (kinetosis, vomiting during toxicosis of pregnancy, postoperative period, radiation sickness, antitumor chemotherapy, etc.). Classification of laxatives. Features of the mechanism of action of lactulose and indications for use.

Тема 10. Antiarrhythmic drugs. cardiac glycosides. Non-glycoside cardiotonic drugs. Antianginal and hypolipidemic agents.

Лекционное занятие. Lecture 10. Antiarrhythmic drugs.

The action potential of the cardiomyocyte. Chrono-, ino- and bathmotropic effects. Drugs for the treatment of bradyarrhythmias and AV block. Features of pharmacodynamics and classification of drugs for the treatment of tachyarrhythmias. Indications for use. Side effects.

Lecture 11. Antianginal drugs.

Principles of IHD pharmacotherapy: increase in delivery and decrease in myocardial O2 demand. Pharmacological effects on CHD risk factors: blood pressure control, treatment of diabetes mellitus, lipid-lowering therapy. Antianginal drugs. Nitrates. Mechanisms of antianginal action. Bioavailability by various routes of administration. The effect of the first pass through the liver. Side effects, tolerance problem when prescribing nitrates. Dangerous interactions of nitrates with type V phosphodiesterase inhibitors. Nitric oxide donors of other groups: sydnonimine derivatives. Adrenoblockers. Classification depending on the selectivity of action, lipophilicity, membrane stabilizing activity. Mechanisms of antianginal action. Contraindications to the use of adrenoblockers. Inhibitors of If-channels of the SA-node. Blockers of slow calcium channels. Mechanisms of antianginal action. Classification by chemical structure and duration of action. BMKK generations. Differences in the effect on Ca2+ channels of the myocardium and vascular smooth muscle. Lipid-lowering drugs. The concept of the types of hyperlipoproteinemia. The main groups of lipid-lowering drugs: Statins (inhibitors of HMG-CoA reductase). fibrates. Preparations of nicotinic acid. Bile acid sequestrants. Cholesterol absorption inhibitors. □-3-Polyunsaturated fatty acids. Monoclonal antibodies to proprotein convertase subtilisin-kexin type 9 (PCSK9), Side effects of various lipid-lowering drugs.

Лабораторное занятие. Laboratory lesson 12. Antiarrhythmic drugs. cardiac glycosides. Non-glycoside cardiotonic drugs.

The action potential of the cardiomyocyte. Chrono-, ino- and bathmotropic effects. Drugs for the treatment of bradyarrhythmias and AV block. Classification of drugs for the treatment of tachyarrhythmias. cardiac glycosides. The role of glycone and aglycone in the pharmacokinetics and pharmacodynamics of cardiac glycosides. The mechanism of systolic and diastolic action, influence on the conduction system of the heart. Action on Na+/K+- ATPase and Na+/Ca2+-exchanger. Extracardiac action of cardiac glycosides. The concept of myocardial remodeling. Drugs for the treatment of CHF. Means that reduce the load on the myocardium. Means that stimulate contractile activity of the myocardium: Drugs for the treatment of acute heart failure. Mechanism of action. Indications for use. Side effects. Contraindications.

Laboratory lesson 13. Antianginal and lipid-lowering agents. Principles of IHD pharmacotherapy: increase in delivery and decrease in myocardial O2 demand. Pharmacological effects on CHD risk factors: blood pressure control, treatment of diabetes

mellitus, lipid-lowering therapy. Antianginal drugs. Nitrates. Mechanisms of antianginal action. Bioavailability by various routes of administration. The effect of the first pass through the liver. Side effects, tolerance problem when prescribing nitrates. Dangerous interactions of nitrates with type V phosphodiesterase inhibitors. Nitric oxide donors of other groups: sydnonimine derivatives. adrenoblockers. Classification depending on the selectivity of action, lipophilicity, membrane stabilizing activity. Mechanisms of antianginal action. Contraindications to the use of adrenoblockers. Inhibitors of If-channels of the SA-node. Blockers of slow calcium channels. Mechanisms of antianginal action. Classification by chemical structure and duration of action. BMKK generations. Differences in the effect on Ca2+ channels of the myocardium and vascular smooth muscle. Lipid-lowering drugs. The concept of the types of hyperlipoproteinemia. The main groups of lipid-lowering drugs: Statins (inhibitors of HMG-CoA reductase). fibrates. Preparations of nicotinic acid. Bile acid sequestrants. Cholesterol absorption inhibitors. -3-Polyunsaturated fatty acids. Monoclonal antibodies to proprotein convertase subtilisin-kexin type 9 (PCSK9), Side effects of various lipid-lowering drugs.

Тема 11. Antihypertensive and diuretic agents.

Лекционное занятие. Lecture 12. Antihypertensive and diuretic drugs

Classification of antihypertensive drugs. Classification of diuretics according to the chemical structure, according to the mechanism of action, according to the localization of action, according to the strength of the diuretic effect. Indications for each group, mechanisms of action.

Lecture 13. Side effects of diuretics: hypokalemia, hypomagnesemia, secondary aldosteronism; violation of ASC, metabolic disorders (impaired glucose tolerance, hypertriglyceridemia). Pharmacodynamic interactions of diuretics with non-steroidal anti-inflammatory drugs, aminoglycoside antibiotics.

Лабораторное занятие. Lab 14. Antihypertensive and diuretic drugs

Classification of antihypertensive drugs. Classification of diuretics according to the chemical structure, according to the mechanism of action, according to the localization of action, according to the strength of the diuretic effect. Indications for each group, mechanisms of action. Side effects of diuretics: hypokalemia, hypomagnesemia, secondary aldosteronism; violation of ASC, metabolic disorders (impaired glucose tolerance, hypertriglyceridemia). Pharmacodynamic interactions of diuretics with non-steroidal anti- inflammatory drugs, aminoglycoside antibiotics.

Тема 12. Фармакологическая регуляция агрегатного состояния крови.

Лабораторное занятие. Laboratory lesson 15. Drugs affecting the hemostasis system.

Features of the pharmacodynamics of drugs that increase and decrease blood clotting. Classification of antiplatelet agents. Cyclooxygenase Inhibitors: Degradation inhibitors and stimulators of cAMP formation. Blockers of ADP-aggregation. Blockers of IIb/IIIa glycoprotein platelet receptors.

Drugs affecting the hemostasis system.

Anticoagulants of indirect and direct action. Low molecular weight and medium molecular weight heparins: Synthetic derivatives of heparin. Direct inhibitors of factor Xa and thrombin. Substances that regulate fibrinolysis. Activators and inhibitors of fibrinolysis. Polyvalent proteinase inhibitors. Mechanism of action, side effects, application in clinical practice.

Тема 13. Antibiotics and chemotherapeutic agents.

Лекционное занятие. Lecture 14. Antibacterial drugs.

Classification of antibacterial agents. Mechanisms of action of antibiotics.

Mechanisms and conditions for the development of resistance of microorganisms to antibiotics. Dosing of antibiotics: single, daily, course doses. The concept of post-antibiotic effect. Medical and social significance of the unreasonable use of antibiotics. Antibiotic prophylaxis and decontamination as methods for preventing nosocomial infections and postoperative complications.

Lecture 15. Complications of antibiotic therapy. Antibiotics and allergies. The concept of dysbiosis, antibiotic-associated diarrhea. Features of the spectrum of antimicrobial action and side effects of various groups of antibiotics.

Lecture 16. Anticancer drugs.

Mechanisms of antitumor action of cytotoxic drugs (cytostatics). Side effects of cytotoxic therapy (suppression of hematopoiesis, secondary immunodeficiency, emetogenicity, hyperuricemia, terato- and carcinogenicity, etc.). Prevention of nausea and vomiting during anticancer chemotherapy. Principles of antitumor therapy of hormone- dependent tumor diseases. The concept of "targeted" antitumor therapy, oncogene products as promising targets for antitumor therapy.

Лабораторное занятие. Laboratory lesson 16. Antibacterial drugs. Classification of antibacterial agents. Mechanisms of action of antibiotics. Dosing of antibiotics: single, daily, course doses.

Laboratory lesson 17. Antiviral, antifungal drugs. Classification of antibacterial agents. Mechanisms of action of antibiotics. Dosing of antibiotics: single, daily, course doses.

Laboratory lesson 18. Anticancer drugs. Classification of antibacterial agents. Mechanisms of action of antibiotics. Dosing of antibiotics: single, daily, course doses.

Раздел 3. Final control work

Тема 14. Exam

Лекционное занятие. Индивидуальная контактная работа (экзамен)

5. Educational technologies

To implement the competence-based approach in the study of the discipline (module), extensive use of active and interactive methods of conducting classes in the educational process is provided:

6. Forms of control and types of evaluation materials for the discipline (module)

Intermediate attestation - evaluation of intermediate and final results of training in the discipline (module).

6.1. Sample list of questions for the credit test

Test is not included.

6.2. Sample list of questions for the examination

1. Types of action of medicinal substances (main, side, local, resorptive, etc.), examples.
2. The main types of pharmacotherapy (etiotropic, pathogenetic, symptomatic, substitution, preventive), examples.
3. Ways of introducing medicinal substances into the body, their comparative characteristics.

4. Types of drug transport through biological membranes. Factors affecting the absorption of drugs in the gastrointestinal tract.

5. Basic concepts of pharmacokinetics: absorption, presystemic elimination, bioavailability.

6. Basic concepts of pharmacokinetics: bioavailability, apparent (imaginary) volume of distribution, enzymes of I and II phases of metabolism.

7. Basic concepts of pharmacokinetics: elimination, biotransformation, half-life of drugs. Pathways of drug excretion.

8. The concept of drug clearance. Factors that change the clearance of drugs. General principles for prescribing drugs in renal and hepatic insufficiency.

9. Interaction of medicinal substances (chemical-pharmaceutical, pharmacokinetic, pharmacodynamic). Examples.

10. Effects that develop with repeated use of drugs (cumulation, tolerance, tachyphylaxis, drug dependence, sensitization). Examples.

11. Understanding the doses of drugs: therapeutic, saturating, maintenance, toxic doses.

12. Receptor mechanisms of drug action. The concept of full and partial agonists, antagonists and agonists-antagonists.

13. Classification of receptors according to the method of signal transmission. G-protein associated receptor, principles of intracellular signal transduction, examples of pharmacological ligands.

14. Classification of receptors according to the method of signal transmission. Receptor protein kinases, principles of intracellular signal transduction, examples of pharmacological ligands.

15. Classification of receptors according to the method of signal transmission. Ionotropic receptors, principles of intracellular signal transduction, examples of pharmacological ligands.

16. Classification of receptors according to the method of signal transmission. Intracellular receptors that regulate gene transcription. Principles of intracellular signal transmission, examples of pharmacological ligands.

17. Types, structure and localization of M-cholinergic receptors. Intracellular signal transmission and effects associated with the activation of M-cholinergic receptors.

18. Types, structure and localization of N-cholinergic receptors. Intracellular signal transmission and effects associated with the activation of N-cholinergic receptors.

19. Types, structure and localization of α-adrenergic receptors. Intracellular signal transmission and effects associated with the activation of α-adrenergic receptors.

20. Types, structure and localization of β-adrenergic receptors. Intracellular signal transmission and effects associated with the activation of β-adrenergic receptors.

21. Cholinomimetic for the treatment of dementia of the Alzheimer's type, write a prescription. M,N-cholinomimetics: classification, mechanisms of action, pharmacological effects, indications for use.

22. A drug for the treatment of postoperative atony of the bladder, write out a prescription, give a pharmacological description of the group.

23. Anticholinergic drug for the relief of AV blockade, write out a prescription, give a pharmacological description of the group.

24. Anticholinesterase drug of reversible action, write out a prescription, give a pharmacological description of the group.

25. Antidotes for poisoning with organophosphorus compounds, write out prescriptions, give a pharmacological description of groups of drugs.

26. Drug for the treatment of glaucoma, eye drops. Pharmacological characteristics of the group.

27. A drug for the treatment of myasthenia gravis, write out a prescription, give a

pharmacological description of the group.

28. αβ-agonist, write a prescription. Adreno- and sympathomimetics: classification, pharmacological effects, indications for use.

29. Selective β2-agonist, write out a prescription, β-agonists: classification, pharmacological effects, indications for use.

30. Central adrenergic agonist with a sedative and analgesic effect, write out a prescription. Pharmacological characteristics of the group.

31. Anti-depolarizing muscle relaxant that promotes histamine release, write a prescription. Peripheral muscle relaxants: classification, mechanisms of action, side effects.

32. Depolarizing muscle relaxant, write out a prescription, give a pharmacological description of the group.

33. Selective α-blocker, write a prescription. Pharmacological characteristics of adrenoblockers and sympatholytics. Side effects of sympatholytic therapy.

34. β-blocker, eye drops. β-blockers: classification, mechanisms of antihypertensive and antianginal action, main indications and contraindications for use.

35. Selective β-blocker, write a prescription. Mechanisms of antiarrhythmic and antihypertensive action, main indications and contraindications for use.

36. 5HT1A receptor agonist, write a prescription. Pharmacological characteristics of anxiolytics.

37. Agonist of benzodiazepine receptors for the relief of seizures, write out a prescription, give a pharmacological description of the group.

38. Dopamine agonist, write a prescription. The main mechanisms of action of antiparkinsonian drugs.

39. Agonist of μ (opiate) receptors, inhibiting the reuptake of monoamines, write a prescription. Opiate receptor agonists: classification, pharmacological effects, symptoms of opiate withdrawal.

40. Opiate receptor agonist for nonproductive cough, write a prescription. Opiate receptor agonists: classification, pharmacological effects, indications for use.

41. Potassium-sparing diuretic in chronic heart failure.

42. Osmotic diuretic, write a prescription. Diuretics: classification, mechanisms of action, indications for use.

43. Loop diuretic, write a prescription. Pharmacological characteristics of diuretics.

44. Two indirect synergists in hemodynamic pulmonary edema, write prescriptions, pharmacological characteristics of groups.

45. Angiotensin converting enzyme inhibitor with an indirect synergist for the treatment of arterial hypertension, write a prescription. Pharmacological characteristics of the main groups of antihypertensive drugs.

46. A drug that lowers blood pressure by orthostatic type, write a prescription. Drugs used to relieve hypertensive crises, mechanisms of action.

47. Two indirect synergists to reduce platelet aggregation, write prescriptions. Antiaggregants: classification, mechanisms of action.

48. Antithrombin cofactor III, write a prescription. Pharmacological characteristics of heparin, its derivatives and antagonists.

49. Low molecular weight heparin, write a prescription. Direct anticoagulants: classification, mechanisms of pharmacological action.

50. Antivitamin K, write a prescription. Anticoagulants: classification, mechanisms of action, routes of administration.

51. Oral anticoagulant, write a prescription. Pharmacological characteristics of the main groups of drugs that reduce blood clotting.

52. Fibrinolysis inhibitor, write a prescription. Drugs affecting fibrinolysis: classification, mechanisms of action.

53. Recombinant tissue plasminogen activator, write a prescription. Fibrinolytics:

classification, mechanisms of action, indications for use.

54. A drug to stop bleeding from dilated veins of the esophagus in liver cirrhosis, write a prescription. Pharmacological characteristics of drugs that increase blood coagulation.

55. Benzathine benzylpenicillin, write a prescription. Pharmacological characteristics of antibiotics of the penicillin group.

56. Broad spectrum penicillin with β-lactamase inhibitor, write a prescription. The main mechanisms of development of antibiotic resistance.

57. Semi-synthetic penicillin antibiotic resistant to β-lactamase, write a prescription. Penicillins: classification, mechanism and spectra of antimicrobial activity.

58. Semi-synthetic penicillin for the treatment of S. aureus infection, write a prescription. β-lactam antibiotics: classification, mechanisms of action, features of antimicrobial action spectra.

59. A drug for the treatment of infection caused by methicillin-resistant S. aureus, write out a prescription, give a pharmacological description of the group.

60. Oral antibiotic of a number of cephalosporins, write a prescription. Pharmacological characteristics of β-lactam antibiotics.

6.3. Suggested themes of term papers (projects)

Coursework is not included.

6.4. Suggested themes of term projects

Coursework is not included.

6.5. Suggested topics of calculation and graphic works

Calculation and graphic work is not provided.

7. Educational, methodological, informational and software support of the discipline (module)

The electronic catalog and electronic information resources provided by the scientific library of the FSBEI of HE "I. N. Ulianov Chuvash State University" are available at the link http://library.chuvsu.ru/

7.1. Regulatory documents, standards and rules

1. Order of the Ministry of Health of Russia dated January 14, 2019 N 4n "On approval of the procedure for prescribing medicines, forms of prescription forms for medicines, the procedure for issuing these forms, their accounting and storage" (Registered in the Ministry of Justice of Russia on March 26, 2019 N 54173). - URL: http://www.consultant.ru/document/cons_doc_LAW_321140/ (accessed 29.08.2019). -Text: electronic.

2. Federal Law "On the Circulation of Medicines" dated April 12, 2010 N61-FZ. - URL: http://www.consultant.ru/document/cons_doc_LAW_99350/ (accessed 29.08.2019). - Text: electronic.

3. GOST R ISO 14155-2014 Clinical trials. Good clinical practice. - URL: http://docs.cntd.ru/document/1200110952. (accessed 29.08.2019). -Text: electronic.

7.2. Recommended basic educational and methodological literature

№ item	Name
1	Alyautdin R. N. Pharmacology. Illustrated textbook [Электронный ресурс]:. - Москва: ГЭОТАР-Медиа, 2020. - – Режим доступа: https://www.studentlibrary.ru/book/ISBN9785970456651.html
2	Kharkevitch D. A. Pharmacology [Электронный ресурс]:. - Москва: ГЭОТАР-Медиа, 2019. - – Режим доступа: https://www.studentlibrary.ru/book/ISBN9785970449851.html

7.3. Recommended supplementary educational and methodological literature

№ item	Name
1	Еникеева Д. А., Бондарчук Н. Г., Аляутдин Р. Н., Фисенко В. П. Pharmacology. Part 1. Workbook [Электронный ресурс]:. - Москва: ГЭОТАР-Медиа, 2021. - – Режим доступа: https://www.studentlibrary.ru/book/ISBN9785970462027.html
2	Kharkevitch D. A. Pharmacology [Электронный ресурс]:. - Москва: ГЭОТАР-Медиа, 2018. - – Режим доступа: https://www.studentlibrary.ru/book/ISBN9785970443071.html

7.4. List of resources of the "Internet" information and telecommunication network

№ item	Name	Link to the resource
1	State Register of Medicines http://www.grls.rosminzdrav.ru/	https://grls.rosminzdrav.ru
2	Reference book of drugs RLS [Electronic resource]. – Access mode: http://www.rsl.ru	http://www.rsl.ru
3	Database of medical and biological publications [Electronic resource]. – Access mode: https://www.ncbi.nlm.nih.gov/pubmed/	https://www.ncbi.nlm.nih.gov/pubmed/
4	International non-profit Cochrane Physician Collaboration http://www.cochrane.org	http://www.cochrane.org
5	Single window to educational resources [Electronic resource]. – Access mode: http://window.edu.ru	http://window.edu.ru
6	Evidence-based pharmacotherapy in cardiology http://www.carduodrug.ru	http://www.carduodrug.ru
7	Antibiotics and antimicrobial therapy http://www.antibiotic.ru	http://www.antibiotic.ru

7.5. Software, professional databases, information and reference systems, electronic educational resources and electronic library systems

Software, professional databases, information and reference systems provided by the Informatization Department of the FSBEI of HE "I.N. Ulianov Chuvash State University" are available for download at the link http://ui.chuvsu.ru //. The Unified Register of Russian programs for electronic computers and databases, including freely distributed ones, is available at the link reestr.minsvyaz.ru/reestr /.

7.5.1. Licensed and freely distributed software

Microsoft Windows operating System and/or Unix-like operating system and/or mobile operating system;

Office software packages:

Microsoft Office and/or LibreOffice

and (or) OpenOffice and (or) analogues;

Browsers, including Yandex.Browser.

List of software:

7.5.2. Lists of professional databases and (or) information reference systems and (or) electronic library systems and (or) electronic educational resources

8. Material and technical support of the discipline

Classrooms for lecture-type classes in the discipline are equipped with a teacher's automated workplace consisting of: a personal computer/laptop, multimedia equipment with a screen and (or) SMART interactive whiteboard/SMART TV.

The premises for students' independent work are equipped with computer equipment enabling to connect to the Internet and provide access to the electronic information and educational environment of the FSBEI of HE "I.N. Ulianov Chuvash State University".

№ item	Lesson type	Brief description and characteristics of the composition of installations, measuring and diagnostic equipment, computer equipment and experimental automation tools
1		Учебная аудитория для занятий лекционного типа, семинарского типа. Оборудование: учебная доска, учебная мебель, мультимедийное оборудование (проектор, экран, ПК или ноутбук)
2		Учебная аудитория для семинарского типа, текущего контроля и промежуточной аттестации. Оборудование: учебная доска, учебная мебель, мультимедийное оборудование (проектор, экран, ПК или ноутбук)

9. Means of adapting the discipline teaching to the needs of persons with physical conditions

If necessary, persons with physical conditions can be offered one of the following options for perceiving information, taking into account their individual psychophysical characteristics:

1) using e-learning and distance learning technologies.

2) using special equipment (enginery) and software in accordance with the students' health restrictions in the Training Centers for Persons with Disabilities and Physical Conditions (hereinafter referred to as special needs) available at the university.

In the course of training, if necessary, the following conditions are provided for persons with visual, hearing and musculoskeletal disorders:

- for persons with visual impairments: educational and methodological materials in printed form in enlarged font; in the form of an electronic document; in the form of an audio file (conversion of educational materials into audio format); in printed form in Braille; individual consultations involving a tactile interpreter; individual assignments and consultations.
- for people with hearing impairments: educational and methodological materials in printed form; in the form of an electronic document; video materials with subtitles; individual consultations involving a sign language interpreter; individual assignments and consultations.
- for persons with disorders of the musculoskeletal system: educational and methodological materials in printed form; in the form of an electronic document; in the form of an audio file; individual assignments and consultations.

10. Guidelines for students to perform independent work

The purpose of the student's independent work (IW) is to consolidate the theoretical knowledge gained and to acquire practical skills in using and performing research of algorithms and data structures when designing application software programs. IW includes independent study of educational issues, preparation for laboratory classes, performing calculation and graphic work, preparation for a test and an exam.

The list of questions and tasks for independent work to prepare for laboratory classes is given in the corresponding methodological instructive regulations in the description of each laboratory work.

The list of questions and tasks for independent work to carry out calculation and graphic work is given in the relevant methodological instructive regulations.

Independent work is determined by the specifics of the discipline and the methodology of its teaching, the time provided by the curriculum, as well as the level of study at which the discipline is studied. The main forms of organization of independent work of students are: classroom independent work under the guidance and supervision of a teacher (at lectures, practical classes and consultations); extracurricular independent work under the guidance and supervision of a teacher (at consultations, during research work), extracurricular independent work without the direct participation of a teacher (preparation for classroom studies, olympiads, conferences, performing tests, working with electronic information resources, preparing for exams and offsets). Independent work of students is provided by these methodological recommendations.

Topics submitted for independent study must be outlined. The abstract briefly outlines the main essence of the educational material, provides the necessary justifications,

tabular data, diagrams, calculations of a medical prescription, etc. It is advisable to write an abstract entirely on the topic. At the same time, it is always possible to supplement the compiled abstract with clippings and extracts from scientific articles, new textbooks, brochures on the exchange of experience, data from the Internet and other sources. Thus, the abstract becomes a collection of necessary materials, where the student brings everything new that he has studied and learned. Such notes are of great value in preparing for classes.

The main stages of independent study of educational issues:

1. Initial acquaintance with the material of the topic under study in the text of the textbook, additional literature.

2. Highlighting the main thing in the material being studied, compiling the usual brief notes.

3. Selection of reference signals for this text in the form of individual words, certain signs, graphs, drawings.

4. Thinking over a schematic way of coding knowledge, using a different font, etc.

5. Drawing up a basic abstract.

11. Methodological instructive regulations for students studying the discipline (module)

Mastering the discipline involves solving the following tasks:

- development of theoretical material, deepening and expansion of theoretical knowledge for the purpose of their application at the level of intersubject communications;
- systematization and consolidation of the received theoretical knowledge and practical skills;
- formation of skills for the search and use of normative, legal, reference and special literature;
- development of cognitive abilities and activity, creative initiative, independence, responsibility and organization;
- formation of independent thinking, abilities for self-development, self-education, self-improvement and self-realization;
- development of research skills;
- formation of the ability to solve practical problems (in professional activities), using the acquired knowledge, abilities and skills.

The main forms of independent work of students are: classroom independent work under the guidance and supervision of a teacher (at lectures, laboratory classes and consultations); extracurricular independent work under the guidance and supervision of a teacher (at consultations, during research work), extracurricular independent work without the direct participation of a teacher (preparation for classroom studies, olympiads, conferences, work with electronic information resources).

Preparation of students for the test includes:

- viewing the program of the training course;
- determination of the sources necessary for the preparation (textbooks, additional literature, etc.) and their study;
- use of lecture notes, laboratory materials;
- Counseling with a teacher.

Preparation for the test begins with the first lesson in the discipline, in which students receive a general attitude from the teacher and a list of basic requirements for current and final reporting. At the same time, it is important from the very beginning to systematically master the material, guided, first of all, by the list of questions for the test, to outline the sources that are important for solving educational problems. During the semester, there is a replenishment, systematization and adjustment of learning developments, the development of new and consolidation of already studied material

11.1. Methodological instructive regulations for preparing for seminar-type classes

Laboratory work is one of the forms of mastering theoretical material with the

simultaneous formation of practical skills in the discipline under study.

The purpose of laboratory work is to deepen the study of theoretical material, the formation of practical skills through regular and systematic independent work of students throughout the course. The process of preparation for laboratory work includes the study of legal documents, mandatory and additional literature on the issue under consideration. Direct laboratory work involves:

- study of theoretical material on the topic of laboratory work (on the issues of the topic being studied);
- performance of necessary calculations and experiments;
- preparation of a report with filling in the necessary tables, plotting graphs, preparing conclusions on the experiments and theoretical calculations;
- for each laboratory work, control is carried out: the content of the report is checked, the assimilation of theoretical material is checked. Control of assimilation of theoretical material is individual.

11.2. Methodological instructive regulations for preparing for an examination

The exam aims to assess the development of competencies by students for
a certain course: acquired theoretical knowledge, its strength, development
logical and creative thinking, the acquisition of independent work skills,
the ability to analyze and synthesize the acquired knowledge and apply in practice
solution of practical problems.
The exam is conducted on tickets approved by the head of the department.
The examination paper includes two questions and a task(s). Wording
issues is the same as the wording of the list of issues brought to the attention of
students one month before the exam session. In preparation for
the exam is held pre-examination consultation for all study groups.
The result of the exam is expressed as "excellent", "good", "satisfactory".
In order to refine the score, the examiner may specify several additional
issues that do not go beyond the requirements of the work program of the discipline (module).
An additional question is a question that is not related to the topic.
ticket questions. An additional question, as well as the main questions of the ticket, requires
extended answer. In addition, the teacher can set a number of clarifying and
leading questions related to the subject of the main questions of the examination
ticket. The number of clarifying and leading questions is not limited.
A student who has completed the tasks in full is allowed to take the exam.
the discipline (module) provided for in the work program. In case of missing any
or types of studies for good or bad reasons
the student independently performs and submits for verification in writing the general
or individual tasks determined by the teacher. Theoretical exam
the course takes place in oral or written form (determined by the teacher) on the basis of
a list of issues that reflect the content of the current work program
academic discipline. Students are encouraged to:
prepare for the exam by carefully reading all the exam questions;
make a plan for answering each question, highlighting the key points of the material;
after studying a few questions, discuss them with classmates.
The answer must be reasoned. Exam results are assessed
grade "excellent", "good", "satisfactory" or "unsatisfactory"

11.3. Methodological instructive regulations for preparing for a test

Test is not provided.

11.4. Methodological instructive regulations for performing computational and graphical

Calculation and graphic work is not provided.

11.5. Methodological instructive regulations for performing a control work

Control work is not provided.

11.6. Methodological instructive regulations for performing a course work (project)

Coursework is not included.

List of additions and changes

The name and details (if any) of the document attached to the Working Program of the discipline (module) containing the text of updates	Department's decision		Full name of department head:
	Date	Protocol №	