Federal State Autonomous Educational Institution of Higher Education

PEOPLE'S FRIENDSHIP UNIVERSITY OF RUSSIA NAMED AFTER PATRICE LUMUMBA

(RUDN)

Medical institute

educational division (faculty/institute/academy) as higher education programme developer

COURSE SYLLABUS

PHARMACOLOGY

Recommended by the Didactic Council for the Education Field of:

31.05.03 Dentistry

field of studies / specialty code and title

The course instruction is implemented within the professional education programme of higher education:

Dentistry

higher education programme profile/specialization title

2024

1. THE GOALS OF MASTERING THE DISCIPLINE

The aim of the course "Pharmacology" is to equip students with the system of knowledge about the principles of drugs classification, their mechanisms of action, pharmacological effects, indications and contraindications for use; the principles of combining drugs, the risk of adverse side effects and their prevention, rules of drugs prescription and drug rational administration.

2. REQUIREMENTS to LEARNING OUTCOMES

The mastering of the discipline "Pharmacology" is aimed at the formation of the following competencies of students:

Universal Competence (UC):

- UC-3

General Professional Competences (GPC):

- GPC-5, GPC-13

Professional competences (PC)

- PC-6

(in accordance with the Federal State Educational Standard of Higher Education (FSES) 3++ 31.05.01 General Medicine).

Table 2.1. The list of competencies formed by students during the development of the discipline (results of the mastering of the discipline)

Competence code	Competence	Indicators of Competence Formation (within the framework of this discipline)
UC-3	UC-3. Being able to organize and supervise teamwork developing a team strategy at the same time to achieve the set goal.	UC-3.3. Solving conflicts and contradictions that may arise in the course of business communication taking into account the interests of all the parties involved.
GPC-6	GPC-6. Being able to prescribe non-drug and drug treatment, monitor its efficacy and safety when solving professional tasks	GPC-6.3. Assessing the possible side effects of taking medicinal drugs. GPC-6.4. Providing medical care to a dental patient in emergency or urgent forms. GPC-6.9. Evaluating the efficacy and safety of using medicinal drugs, medical devices and other methods of treatment at a dental appointment.
GPC-13	GPC-13. Being able to understand the operation principles of modern IT and use them to solve the professional tasks	GPC-13.1. Using information technology in professional activity and observing the information security rules. Information and communication media and technology in professional activity. GPC-13.2. Observing the information security rules in professional activity.
PC-6	PC-6. Being able to analyze and present in public medical information based on evidence-based medicine, participate in scientific research, introduce new methods and techniques aimed at protecting public health	PC-6.1. Searching for medical information based on evidence-based medicine, interpreting data from scientific publications and/or preparing a presentation to make medical information, the results of scientific research public. PC-6.2. Developing algorithms for the

		examination and treatment of adults and children with dental diseases in accordance with the principles of evidence-based medicine, as well as searching and interpreting medical information based on evidence-based medicine. PC-6.3. Conducting public presentation of medical information based on evidence-based medicine/ partial participation in scientific research.

3. THE COURSE IN THE HIGHER EDUCATION PROGRAMME STRUCTURE

The course "Pharmacology" refers to the Compulsory Disciplines of block B1 of the EP HE. Within the framework of the Educational Program, students also master other disciplines and/or practices that contribute to expected learning outcomes of the course "Pharmacology".

Table 3.1. List of Higher Education Program disciplines that contribute to expected learning outcomes

Competence Code and Name	Previous Disciplines	Subsequent disciplines
UC – 3. Being able to organize and supervise teamwork developing a team strategy at the same time to achieve the set goal.	-	Observing and Assisting a Dentist (General Dentistry), Including Research Practice Preparation for and Passing the State Exam State Exam (Computer Testing) State Exam (Interdisciplinary Interview)
GPC-6. Being able to prescribe non-drug and drug treatment, monitor its efficacy and safety when solving professional tasks	General Surgery Immunology, Clinical Immunology	Internal illnesses Clinical pharmacology Surgical diseases Health and Safety Neurology Psychiatry and Narcology Pediatrics Operative Dentistry: Cariology and Hard Tissues Diseases Endodontics Gerodontics and Oral Mucosa Diseases Periodontology Oral Surgery Gnathology and Temporo-Mandibular Joint's Functional Diagnostics Prosthodontics (Simple Prosthetics) Prosthodontics of Edentulous Patient Prosthodontics (Complex Prosthetics) Maxillofacial and Orthognathic Surgery Head and Neck Diseases Pediatric Maxillofacial Dentistry Maxillofacial Prosthodontics Pediatric Dentistry Orthodontics and Pediatric Prosthodontics

		Medical Genetics in Dentistry Medical Rehabilitation Clinical Dentistry Implantology and Reconstructive Surgery Modern Endodontics Observing and Assisting a Dentist (Pediatric) Observing and Assisting a Dentist (General Dentistry), Including Research Practice Preparation for and Passing the State Exam State Exam (Computer Testing) State Exam (Interdisciplinary Interview)
GPC-13. Being able to understand the operation principles of modern IT and use them to solve the professional tasks	Latin language Medical informatics	Obstetrics Medical Rehabilitation Telemedicine Preparation for and Passing the State Exam State Exam (Computer Testing) State Exam (Interdisciplinary Interview)
PC-6. Being able to analyze and present in public medical information based on evidence-based medicine, participate in scientific research, introduce new methods and techniques aimed at protecting public health	Physics Medical Informatics Human Anatomy - Anatomy of Head and Neck Chemistry of Biogenic Elements	Preparation for and Passing the State Exam State Exam (Computer Testing) State Exam (Interdisciplinary Interview)

4. THE DISCIPLINE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the discipline "Pharmacology" is equal to 5 credits.

Table 4.1. Types of academic activities during the period of the HE program mastering.

Types of academic activities	**TOTAL, academic hours (ac.h)**	**Semesters**	
		5	6
Classroom learning , ac.h.	123	51	72
Lectures (LEC)	18	0	18
Lab work (Lab)	105	51	54
Practical/seminar lessons (PL)	36	18	18
Self-studies, ac. h.	21	3	18
Evaluation and assessment (exam or pass/fail grading)	18	0	18
Total labor content			
hours	180	72	108

credits	**5**	**2**	**3**

5. THE COURSE MODULES AND CONTENTS

Table 5.1. The content of the discipline and types of academic activities

Modules and Topics	Content of the topics	Type of academic activities
Module 1. General Pharmacology	**1. Recipe. Introduction to Pharmacology.** Types of prescriptions. Formulation rules in the Russian Federation. Types of dosage forms. ATC classification.	**Lab**
	2. Basic principles of pharmacodynamics Mechanisms of drug action. Antagonists, agonists, partial agonists. Target molecules of drugs (receptors, enzymes, ion channels). Types of pharmacological response: expected pharmacological response, hyperreactivity, tachyphylaxis, idiosyncrasy. The relationship between pharmacokinetics and pharmacodynamics. The concept of a therapeutic index, a therapeutic range. Therapeutic drug monitoring (indications, significance, interpretation of results). Pharmacodynamic interaction of drugs.	**Lab**
	3. Basic principles of pharmacokinetics. Basic pharmacokinetic parameters and their significance. Drug bioavailability, drug absorption pathways, drug distribution volume, degree of binding to blood plasma proteins, drug metabolism, drug elimination, half-life, drug excretion routes, clearance. Factors affecting the value of pharmacokinetic parameters. Pharmacokinetic curve. Pharmacokinetic interaction of drugs.	**Lab**
Module 2. Drugs affecting afferent and efferent innervation	**2.1. Drugs affecting afferent innervation. Local anesthetics.** Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Application in special categories of patients.	**Lab**
	2.2. Cholinergic agents. Anticholinergics. Cholinomimetics. Classification. Pharmacodynamics of groups of drugs, mechanism of action. Pharmacokinetic parameters of drug groups. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients.	**Lab**
	2.3. Adrenomimetics and sympathomimetics Classification. Pharmacodynamics of groups of drugs, mechanism of action. Pharmacokinetic parameters of drug groups. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients.	**Lab**
	2.4.Adrenolythics and sympatholytics. Classification. Pharmacodynamics of groups of drugs, mechanism of action. Pharmacokinetic parameters of drug groups. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients.	**Lab**

Module 3. Pharmacology of drugs groups. Drugs affecting the cardiovascular system	**3.1. Diuretics.** Carbonic anhydrase inhibitors (acetazolamide). Osmodiuretics (mannitol). Loop diuretics (bumetamide, furosemide, ethacrynic acid, torasemide). Diuretics acting on the cortical segment of Henle's loop (hydrochlorothiazide, clopamide, chlorthalidone, metolazone, indapamide). Potassium-sparing diuretics (spironolactone, eplerenone, amiloride, triamterene). Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients.	**Lab**
	3.2. Lipid-lowering agents Statins (fluvastatin, simvastatin, pravastatin, atorvastatin, rosuvastatin); fibrates (clofibrate, bezafibrate, gemfibrozil); derivatives of nicotinic acid (niacin, enduracin); bile acid sequestrants (cholestyramine, colestipol, colesevelam); an inhibitor of intestinal cholesterol absorption (ezetimibe). Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients.	**Lab**
	3.3.Antihypertensive drugs Pathways to affect the renin-angiotensin system (RAS): pharmacology of ACE inhibitors (captopril, enalapril, perindopril, quinapril, moexipril, ramipril, fosinopril, trandolapril, spirapril, lisinopril) and angiotensin receptor blockers (valsartan, candesartan, losartan). Tactics of prescribing ACE inhibitors and angiotensin receptor blockers in hypertension and CHF. Dihydropyridine calcium antagonists: nifedipine, nimodipine, felodipine, amlodipine: pharmacology and place in the treatment of angina pectoris and hypertension. Centrally acting drugs: alpha2-adrenergic agonists (methyldopa, guanfacine, clonidine) and agonists of I1 - imidazoline receptors. Ganglion blockers: azamethonium bromide (penamine), benzohexonium. Features of use in hypertensive crisis. Nitrates (nitroglycerin, isosorbide dinitrate, isosorbide-5-mononitrate, molsidomine): pharmacology, place in the treatment of coronary artery disease. Nitrate tolerance and ways to overcome it.	**Lab**
	3.4. Antianginal drugs 1) reducing myocardial oxygen demand (b-blockers); 2) increasing the delivery of oxygen to the heart (coronary dilators of the myotropic antispasmodic and adenosine type of action); 3) reducing myocardial oxygen demand and increasing oxygen delivery to the heart (nitrates, calcium antagonists). Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients.	**Lab**
	3.5. Antiarrhythmic drugs.	**Lab**

	Class I antiarrhythmic drugs (sodium channel blockers). Subclasses Ia (quinidine, novocainamide, disopyramide, aymaline), Ib (lidocaine, mexiletine, trimecaine, diphenin), Ic (etmozine, etacizin, propafenone, flecainide) - clinical pharmacology, indications for prescription, changes in ECG during treatment. Class II antiarrhythmic drugs: Beta-blockers: nonselective (propranolol, nadolol, sotalol), selective (oxprenolol, metoprolol, atenolol, betaxolol, bisoprolol, nebivolol), drugs with their own sympathomimetic activity (oxprenolol, pindolokirol-1), drugs with alpha-1-blocking activity (labetalol, carvedilol). Beta-blockers in the treatment of CHF. Class III antiarrhythmic drugs (potassium channel blockers - amiodarone, sotalol, dofetilide, ibutilide): clinical pharmacology, indications for prescription, ECG changes while prescribing these drugs. Class IV antiarrhythmic drugs (calcium antagonists - verapamil, diltiazem): clinical pharmacology, indications for prescription, ECG changes while prescribing these drugs. Antiarrhythmic drugs: adenosine, potassium salts.	
	3.6. Drugs used in heart failure Drugs with a positive inotropic effect: cardiac glycosides (digoxin), non-glycoside cardiotonics (dopamine, dobutamine, amrinone, milrinone, enoximone, levosimendan). The dosage regimen of cardiac glycosides, depending on the state of the gastrointestinal tract, metabolic and excretion organs in the patient, the number and rhythm of heart contractions, the state of contractility and conductivity of the myocardium, the rate of development of the effect, drug interactions and factors contributing to a change in sensitivity to drugs. Diagnostics, correction and prevention of adverse reactions. Drug interactions, adverse drug reactions.	**Lab**
Module 4. Pharmacology of drugs groups. Drugs affecting hemostasis and hematopoiesis	**4.1. Drugs affecting the blood coagulation system.** Antiplatelet agents: acetylsalicylic acid, clopidogrel, ticlopidine, abciximab, anagrelide, alprostadil, lysine acetylsalicylate. Direct anticoagulants: sodium heparin, low molecular weight heparins (sodium enoxaparin, nadroparin, fraxiparin). Indirect anticoagulants: warfarin, coumarins. Fibrinolytics: streptokinase, tissue plasminogen activator (alteplase, prourokinase). Synthetic selective inhibitor of activated factor X (Xa) fondaparinux sodium, rivaroxaban, direct thrombin inhibitor dabigatran. Drugs that increase blood clotting (vitamin K and its analogs, thrombin, hemostatic sponge, fibrinogen). Fibrinolysis inhibitors (aminocaproic acid). Drugs for stopping bleeding in patients with hemophilia (factor VIII cryoprecipitate, antihemophilic plasma, coagulation factor VII, coagulation factor IX). Ethamsylate. Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interactions. Use in special categories of patients.	**Lab, Lec**

	4.2. Drugs affecting the hematopoietic system. Iron preparations. Erythropoietin. Preparations containing folic acid, cyanocobalamin. Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients.	**Lab, Lec**
Module 5. Pharmacology of drugs groups. Drugs affecting the functions of the respiratory system, digestion and metabolic processes	**5.1. Drugs affecting the functions of the respiratory system** Beta-2 adreno-agonists: salbutamol, fenoterol, salmeterol, formoterol. M-anticholinergics: ipratropium bromide, tiotropium bromide. Methylxanthines: theophylline, aminophylline. Mast cell membrane stabilizers (cromoglicic acid), antileukotriene drugs (zafirlukast, montelukast, zileuton). Inhalation GCS. Systemic GCS. Antitussive drugs. Mucolytics, mucoregulators, mucokinetics. Antitussive drugs of central action. Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients. Receptor desensitization syndrome (tachyphylaxis, internalization and decreased regulation - the development of resistance to beta-adreno-agonists), methods of its correction and prevention.	**Lab, Lec**
	5.2. Drugs affecting the functions of the digestive system. Pharmacology of antacids (sodium bicarbonate, calcium carbonate, aluminum hydroxide, aluminum phosphate, magnesium oxide, magnesium hydroxide). Pharmacology of H2-histamine receptor blockers (cimetidine, ranitidine, famotidine, nizatidine, roxatidine). Pharmacology of M-anticholinergics: pirenzepine. Pharmacology of proton pump blockers (omeprazole, esomeprazole, lansoprazole, pantoprazole, rabeprazole). Pharmacology of prokinetics (metoclopramide, domperidone, trimebutine). Pharmacology of gastrocytoprotectors (bismuth, bismuth colloidal subcitrate, misoprostol, sucralfate). Tactics of prescribing antisecretory agents and prokinetics for the treatment and prevention of GERD, functional dyspepsia, NSAID gastropathy. Antibacterial (anti-Helicobacter) drugs in the treatment of peptic ulcer: amoxicillin, clarithromycin, tetracycline, metronidazole. Principles of eradication therapy: indications for eradication, basic therapy regimens, methods of monitoring the effectiveness of treatment.	**Lab, Lec**

	5.3. Hormones of the pituitary gland, hypothalamus, pineal gland, thyroid and pancreas, hypoglycemic drugs. Antidiabetic drugs: insulins (ultrashort, short, medium duration, long-acting), sulfonylurea derivatives (glibenclamide), glinides (repaglinide), biguanides (metformin), α-glycosidase inhibitors (acarbose), thiazolidindiones, dipeptidyl-peptidase-4 inhibitors (DPP-4) (vildagliptin), GLP-1 analogs and agonists (liraglutide), amylin analogs (pramlintide acetate), gliflozins (SGLT2 inhibitors). Thyroid hormone preparations and antithyroid drugs (L-thyroxine, mercazolil, thiamazole, potassium iodide). Preparations of hormones of the pituitary gland and hypothalamus. Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients. Principles of substitution therapy. **5.4. Hormonal preparations of steroid structure** **Sex steroids. Contraceptives. Anabolic drugs.** **Glucocorticoids.** Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients. Principles of substitution therapy. **5.5. Drugs affecting immune processes**. I. Cytostatics: a) alkylating agents: cyclophosphamide b) antimetabolites: azathioprine methotrexate Glucocorticoids: prednisone, etc. Drugs that inhibit the formation or action of IL-2: a) antibiotics: cyclosporine tacrolimus, rapamycin b) MAT preparations for IL-2 receptors: basiliximab, daclizumab. Antibody preparations: a) Polyclonal antibodies - anti-thymocyte immunoglobulin b) MAT to TNF-alpha - infliximab etc. 4-aminoquinoline derivatives (chloroquine, hydroxychloroquine), D-penicillamine, Gold preparations (sodium aurothiomalate, auranofin, etc.). Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients. II. Immunostimulants. Preparations of bacterial and fungal origin, their synthetic and semi-synthetic analogs. Preparations of animal origin.	**Lab, Lec** **Lab, Lec** **Lab**

	Cytokines (interferons, interleukins) and stimulators of their formation in the body. Herbal preparations. Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients. **5.6. Antiallergic drugs** Types of allergic reactions. Pathogenesis of allergic and pseudo-allergic reactions. Points of application of drugs. Drugs for the treatment of immediate-type hypersensitivity reactions: 1) agents that prevent the release of histamine and other mediators of allergy - glucocorticoids, cromoglicic acid (cromolyn sodium); 2) antihistamines - H1-histamine blockers; 3) symptomatic agents - adrenergic agonists (adrenaline, ephedrine), myotropic bronchodilators (aminophylline). Drugs for the treatment of delayed-type hypersensitivity reactions: GCS, cytostatics. Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients.	**Lab**

Module 6. Pharmacology of drugs groups. Drugs affecting the central nervous system. Medicines affecting the nociceptive system and the synthesis of pain and inflammation mediators	6.1. **Preparations for inhalation and intravenous anesthesia. Analgesics** Opioid analgesics. Non-steroidal anti-inflammatory drugs (NSAIDs). Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients. 6.2. **Sedative drugs, hypnotic drugs. Antiepileptic drugs.** Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients. 6.3. **Antipsychotics. Antidepressants. Drugs for the treatment of manias.** Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients. 6.4. **Psychostimulants. Nootropics (piracetam). Drugs for neurodegenerative diseases.** Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients.	**Lab, Lec**
Module 7. Pharmacology of drugs groups. Antibacterial, antiviral and antifungal medicines	**7.1. Antibiotics of natural origin and semisynthetic agents.** The main clinically significant pathogens. Mechanisms of resistance. General features of antimicrobial drugs. Types of antimicrobial pharmacotherapy. Principles of antimicrobial therapy. Classification of antibiotics and their mechanisms of action. Beta-lactam antibiotics. Pharmacology of penicillins. Pharmacology of cephalosporins (1st generation: cefazolin, cephalexin, cefaclor; 2nd generation: cefamandol, cefuroxime; 3rd generation: cefoperazone, cefotaxime, ceftriaxone; 4th generation: cefepime, 5th generation: ceftobiprole). Pharmacology of carbapenems (imipenem, meropenem) and monobactams (aztreonam). **7.2. Non-beta-lactam antibiotics and synthetic antimicrobial agents:** Non-beta-lactam antibiotics. Pharmacology of aminoglycosides (gentamicin, amikacin, tobramycin, netilmicin). Pharmacology of macrolides (erythromycin, roxithromycin, azithromycin, clarithromycin). Pharmacology of tetracyclines (tetracycline, doxycycline) and glycopeptides (vancomycin, teicoplanin) and amphenicols. New groups of antibiotics: oxazolidinediones (linezolid), lipopeptides (daptomycin), glycylcyclines (tigecycline), pleuromutilins (retapamulin). Sulfonamides, derivatives of quinolone and fluoroquinolone, derivatives of 5-nitrofuran, imidazole. Classification. Pharmacodynamics of the drug group, mechanism of action.	**Lab, Lec** **Lab, Lec**

	Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients. **7.3. Antiviral, antifungal agents.** Antifungal: amphotericin B, itraconazole, ketoconazole, clotrimazole, nystatin, sertaconazole, fluconazole. Antiviral: anti-herpetic, anti-cytomegalovirus, anti-influenza (M2 channel blockers, neuroaminidase inhibitors), antiretroviral drugs, agent against SARS-CoV-2. Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients. **7.4. Anti-tuberculosis drugs.** 1st line drugs, 2nd line drugs, 3rd line drugs Anti-tuberculosis chemotherapy regimens. Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients. **7.5. Antiprotozoal, anti-syphilitic, anthelmintic drugs and nematicides** Classification. Pharmacodynamics of the drug group, mechanism of action. Pharmacokinetic parameters of the drug group. Indications. Contraindications Adverse reactions. Drug interaction. Use in special categories of patients.	**Lab, Lec** **Lab, Lec** **Lab, Lec**

6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENT

Table 6.1. Logistical and material provision of the discipline.

Classroom for Academic Activity Type	**Classroom Equipment**	**Specialized educational / laboratory equipment, software and materials for mastering the discipline**
Learning Lab	Classroom, equipped with a set of specialized furniture; whiteboard; a set of devices includes portable multimedia projector, laptop, projection screen, stable wireless Internet connection. Software: Microsoft Windows, MS Office /Office 365, MS Teams, Chrome (latest stable release), Skype Classrooms 349, 350, 352	Classroom for lectures and lab works, group and individual consultations, current control and intermediate certification. A set of specialized furniture; technical devices: Optoma HD36 multimedia projector, Lenovo IdealPad330-5ikb laptop, Internet access. Wall projection screen, floorboard information marker magnetic, interactive complex for testing students.
Classroom for students self-studies	Classroom, equipped with a set of specialized furniture; whiteboard; a set of devices includes portable multimedia projector, laptop, projection screen, stable wireless Internet connection. Software: Microsoft Windows,	Classroom for lectures and lab works, group and individual consultations, current control and intermediate certification. A set of specialized furniture; technical devices: Optoma HD36 multimedia projector, HP250G7 laptop, Internet access.

Classroom for Academic Activity Type	Classroom Equipment	Specialized educational / laboratory equipment, software and materials for mastering the discipline
	MS Office /Office 365, MS Teams, Chrome (latest stable release), Skype Classroom 349	Wall projection screen, floorboard information marker magnetic, interactive complex for testing students.
Learning-and Research Lab	Classroom, equipped with a set of specialized furniture; whiteboard; a set of devices includes portable multimedia projector, laptop, projection screen, stable wireless Internet connection. Software: Microsoft Windows, MS Office /Office 365, MS Teams, Chrome (latest stable release), Skype Lab No 1 on the base of the city hospital 24	Wall projection screen, magnetic floor information marker board, Optoma HD36 multimedia projector, Lenovo 15.6 laptop, centrifuge 5804, analytical scale AF225DPCT, Vortekx shaker, CryoCubeF101h freezer

7. RECOMMENDED SOURCES FOR COURSE STUDIES.

Main reading

1. Illustrated textbook / editor R.N. Alyautdin. - Электронные текстовые данные. - Moscow : GEOTAR-Media, 2020. - 312 p. - Книга на английском языке. - ISBN 978-5-9704-5665-1.

Additional reading

1. Tutorial Guide to Pharmacokinetics: учебное пособие / С.К. Зырянов, О.И. Бутранова, М.Б. Кубаева. – Москва: РУДН, 2022. – 134 с.: ил. ISBN 978-5-209-10837-5

2. Tutorial Guide to Pharmacodynamics [Текст] = Пособие по фармакологии : Учебное пособие / S.K. Zyryanov, O.I. Butranova. - Книга на английском языке. - M. : PFUR, 2019. - 56 с. : ил.

3. Basic and Clinical Pharmacology / B. Katzung, S. Masters. - 11th ed. ; Книга на английском языке. - New York : McGraw-Hill, 2009. - 1218 p. : il. - (LANGE Basic Science). - ISBN 978-007-127118-9 : 4318.03.

4. Clinical Pharmacology / P.N. Bennett, M.J. Brown. - 10th ed. ; Книга на английском языке. - Edinburgh : Churchill Livingstone, 2008. - 694 p. : il. - ISBN 978-0-443-10245-5 : 2048.65.

Internet (based) sources

1. Electronic libraries with access for RUDN students:

-Electronic library network of RUDN – ELN RUDN
http://lib.rudn.ru/MegaPro/Web

- ELN «University Library online» http://www.biblioclub.ru
- ELN Urait http://www.biblio-online.ru
- ELN «Student Advisor» www.studentlibrary.ru
- ELN «Lan» http://e.lanbook.com/

2. Databases and search engines:

- electronic fund of legal and regulatory and technical documentation
http://docs.cntd.ru/
- search system Yandex https://www.yandex.ru/

- search system Google https://www.google.ru/
- abstract database SCOPUS http://www.elsevierscience.ru/products/scopus/

Learning toolkits for self-studies during the development of the discipline*:

1. A course of lectures on the discipline "Pharmacology".
2. Guidelines for self-study on the discipline "Pharmacology"

* - all educational and methodological materials for independent work of students are placed in accordance with the current procedure on the page of the discipline on RUDN LMS TUIS!

8. EVALUATION TOOLKIT AND GRADE SYSTEM FOR ASSESSMENT

Evaluation Toolkit (ET) and a point-rating system (PRS)* for assessment the level of competence formation (part of competencies) based on the results of mastering the discipline "Pharmacology" are presented in the Appendix to this Work Program of the discipline.

** - ET and PRS are formed on the basis of the requirements of the relevant local regulatory act of the RUDN*

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