

Curriculum is based on the educational standard OSVO 1-33 80 05-2019 and the specialty 1-33 80 05 Medical and biological Science No. 120-19/edu mag. from 06/18/2019

COMPILERS:

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RECOMMENDED FOR APPROVAL:

by the Ecological Chemistry and Biochemistry Department of the Educational Institution «International Sakharov Environmental Institute» Belarusian State University (protocol No. 5 dated 13.12. 2019);

by the Scientific and Methodological Council of the Educational Institution «International Sakharov Environmental Institute» Belarusian State University (protocol No. 4 dated 19.12. 2019).

EXPLANATORY NOTE

«Clinical pharmacology» is the discipline that contains systematic scientific knowledge about the effects of medicinal products on the human body in order to increase the effectiveness and safety of their clinical use.

The purpose of the discipline "Clinical Pharmacology" is to acquire students' scientific knowledge of the clinical pharmacodynamics and pharmacokinetics of drugs, drug interactions and adverse reactions, strategies for differentiated choice and individual use of drugs.

The tasks of the discipline are to develop the students' academic competences, based on the ability to self-search educational and information resources, as well as acquire and understand the knowledge of:

- basic concepts of clinical pharmacology;
- clinical pharmacokinetics and pharmacodynamics of drugs, drug interactions and undesirable (side) reactions;
- principles of choosing the most effective and safe medicines;
- optimal dosage regimens for medicinal products;
- clinically valid combinations of drugs that can be used in specific clinical situations.

The tasks of teaching the discipline include the formation of students' social, personal and professional competences, based on the knowledge and application of:

- clinically justified principles of rational choice of medicines for pharmacotherapy, meeting modern requirements for its effectiveness and safety;
- methods for monitoring the safety of pharmacotherapy.

During the training period, students should master the following *competencies*: be able to conduct research in the field of development, production and circulation of pharmaceuticals.

As a result of studying the discipline (name of the discipline) the student should

know:

- nomenclature and main classes of medicines;
- rules for the new medicines clinical approbation and registration;
- principles of drug selection, types of drug interactions, methods for evaluating the effectiveness and monitoring the safety of drugs;
- basic pharmacokinetics and dosage characteristics of drugs for various pathologies, in various categories of patients;
- problems of drug allergy, principles of its prevention and treatment;
- methods of preventing adverse drug reactions;

be able to:

- choose groups of drugs for the treatment of certain diseases, their optimal dosage regimen, route of administration and duration of use, predict possible side effects;

- evaluate scientific information on the effectiveness of drugs and other drugs, work with reference and other literature on drugs;

master:

- methods of choosing the optimal drug taking into account its effectiveness, safety profile and acceptability;

- methods for assessing the efficacy and safety of ongoing pharmacotherapy.

To manage the educational process and the organization of control and evaluation activities, it is recommended to use educational and methodological complexes, periodically conduct ongoing monitoring of knowledge in laboratory and practical classes, and protect the completed laboratory work.

Self-preparation of students includes the preparation of presentations on pressing problems of clinical pharmacology, the development of research projects.

The main methods (technologies) of training that meet the objectives of studying the discipline are:

- elements of problem-based learning, implemented at lectures and laboratory classes;

- competency-based approach carried out at lectures, laboratory classes and during independent work;

- educational and research activities conducted in laboratory, practical classes;

- block-modular knowledge assessment system.

In order to form modern and socio-professional competencies of a graduate of a higher education institution, it is advisable to introduce active teaching methods and discussion forms into the practice of conducting classes.

The total number of hours devoted to the study of a discipline is 90 hours, of which 42 hours are classroom lessons (16 hours of lectures, 16 hours of laboratory classes and 10 hours of practical classes).

The form of the current certification is an exam in 1 semester.

Form of higher education at the II level – full-time and part-time.

CONTENT OF THE EDUCATIONAL MATERIAL

1. General issues of Clinical Pharmacology

1.1. Introduction to the academic discipline. Basis of evidence-based medicine

Goals and objectives of the educational discipline "Clinical Pharmacology", the main stages of the clinical pharmacology development, the relationship with other science and special educational disciplines. Clinical pharmacology as the basis of rational pharmacotherapy. Basic principles of evidence-based medicine.

Nomenclature of medicinal products (international non-proprietary and trade names). Principles of the medicines development. Original and generic medicines. The purpose, objectives and methods of medicines clinical trials. Medical, methodological and ethical aspects of clinical trials. Ethics Committee, its role and tasks. Types and phases of clinical trials. Biological and therapeutic equivalence of drugs. Principles of the study of generic medicines bioequivalence. State registration of medicines. Basic provisions of evidence-based medicine.

1.2. Clinical pharmacokinetics and pharmacodynamics of drugs

Clinical pharmacokinetics. Ways of drug administration, their characteristics. Distribution of drugs in the human body. Metabolism of medicines. Basic pharmacokinetic parameters. Bioavailability of drugs. Factors affecting the pharmacokinetics of medicines. Features of drugs pharmacokinetics for prolonged use. Clinical pharmacodynamics and evaluation of its main parameters. The dose–effect relationship. The relationship between pharmacokinetics and pharmacodynamics.

Combined use of medicines. Types of drug interactions. Polypharmacy. Peculiarities of pharmacokinetics and pharmacodynamics of medicines in elderly patients, women during pregnancy and lactation, patients with liver and kidney diseases. The choice of dosage regimen of the drug. Accounting for drug interactions during treatment. Identify, register and prevent unwanted (adverse) reactions. Notification of suspected adverse reaction to the drug.

2. Clinical pharmacology of drugs

2.1. Clinical pharmacology of antiallergic drugs

The concept of receptors, the types of receptors. Types of interaction of drugs with receptors. The development mechanism of immediate-type hypersensitivity reactions (urticaria, Quincke's edema, anaphylaxis, etc.).

Clinico-pharmacological characteristics of the main groups of antiallergic drugs. Anaphylaxis, medicinal anaphylactic shock. Clinical manifestation, diagnosis, and prevention of the drug anaphylactic shock.

Prehospital and hospital stages of providing emergency medical care for anaphylactic shock.

2.2. Clinical pharmacology of antibacterial, antiviral, antifungal and anti-protozoal drugs

Classification and clinical pharmacology of antibacterial drugs. Features of the infectious disease course depending on the pathogen nature, the organism reactivity. Principles of combined antibacterial therapy. Monitoring the effectiveness and safety of antibiotic treatment.

Classification of antiviral drugs. Clinico-pharmacological characteristics of anti-influenza drugs, anti-herpes and antiretroviral drugs, interferons, immunobiological drugs. Principles of the treatment of acute respiratory viral infections.

Modern principles of pharmacological therapy of the most common fungal and parasitic diseases.

Classification of antifungal medicines for local and systemic use.

Clinical pharmacology of the main groups of the drugs used to treat parasitic diseases.

2.3. Clinical pharmacology of steroid and non-steroidal anti-inflammatory drugs, narcotic analgesics

Clinical-pharmacological characteristics of non-steroidal anti-inflammatory drugs. Clinical-pharmacological characteristics of glucocorticoids. Narcotic analgesics. Non-opioid medicines of central action with analgesic activity. Analgesics with the action mixed mechanism.

The tactics of using nonsteroidal anti-inflammatory and combined medicines for hyperthermic and pain syndrome.

2.4. Clinical pharmacology of drugs used in the respiratory system diseases

Clinical-pharmacological characteristics of the antitussive drugs of central, peripheral, mixed effect. Expectorant and mucolytic drugs, especially their use. Drugs for the relief of bronchial obstructive syndrome (beta-2-adrenomimetics, M-cholinoblockers, xanthines, combined drugs).

Clinical-pharmacological characteristics and features of the use of drugs for the basic anti-inflammatory therapy of bronchial asthma. Application of stabilizers of the mast cells membranes.

Phytotherapy in pulmonology.

2.5. Clinical pharmacology of medicines used in cardiology

Clinical-pharmacological characteristics of antihypertensive drugs: diuretics, beta-adrenoblockers, slow calcium channel blockers, angiotensin converting enzyme inhibitors, angiotensin receptor blockers, central alpha 2- and imidazoline receptor agonists. Representatives of antihypertensive drugs other groups: alpha-adrenoblockers, inhibitors of renin synthesis, direct antagonists of aldosterone, etc. Principles of arterial hypertension modern pharmacotherapy.

Clinical-pharmacological characteristics of anti-anginal and anti-ischemic drugs: beta-adrenoblockers, slow calcium channel blockers, nitrates, sydnonimines, cardiac cytoprotectors.

Medicines that correct lipid metabolism.

Modern principles of the treatment of ischemic heart disease.

Clinical-pharmacological characteristics of antiarrhythmic drugs, Vogen-Williams classification, mechanisms of antiarrhythmic action, indications and contraindications to their use, safety control.

Medicines used in the treatment of disorders of the heart conduction system.

2.6. Clinical pharmacology of medicines used in gastroenterology

Clinical-pharmacological characteristics of antisecretory drugs, antacids. Medicines that have a protective effect and enhance the regeneration of the gastrointestinal tract mucous membrane. Diagrams of Helicobacter eradication. Classification of antiemetic drugs. Drugs affecting the motor function of the gastrointestinal tract. Enzyme drugs of substitution therapy. The use of choleric drugs and hepatoprotectors. Antidiarrheal and laxative drugs. Drugs that regulate intestinal microbiocenosis.

Phytotherapy of the digestive system diseases.

2.7. Clinical pharmacology of drugs affecting the hemostatic system

The main causes leading to the function disruption of the blood coagulation and anticoagulation systems. Clinical-pharmacological characteristics of antiplatelet agents, direct and indirect anticoagulants, thrombolytic drugs.

Essential medicines used to reduce the activity of the blood coagulation system (proagregants, procoagulants, inhibitors of fibrinolysis), indications and contraindications to the use, methods of assessing the effectiveness.

2.8. Clinical pharmacology of anti-anemia drugs

Classification of anemia. Iron deficiency, B₁₂- and folic deficiency anemia: etiology, clinical manifestations and principles of pharmacotherapy. Clinical-pharmacological characteristics of anti-anemic drugs. Indications and contraindications to the use of iron-containing drugs and cyanocobalamin. Criteria for the effectiveness of ongoing pharmacological therapy.

2.9. Clinical pharmacology of medicines used for the treatment of type II diabetes and thyroid diseases

Clinical-pharmacological characteristics of derivatives of sulfonylurea, biguanides, meglitinides, thiazolidinediones and incretins. Derivatives of insulin. Indications and contraindications, methods of monitoring the effectiveness and safety of insulin therapy.

Drugs for replacement therapy for hypothyroidism. Clinical-pharmacological characteristics of antithyroid drugs.

EDUCATIONAL DISCIPLINE CURRICULAR CHART

Section, topic #	Section (topic) name	Number of hours					The number of hours of controlled monitoring	Form of control
		lectures	practical classes	seminars	laboratory	other		
1	2	3	4	5	6	7	8	9
1	General issues of Clinical Pharmacology							
1.1	Introduction to the academic discipline. Basis of evidence-based medicine	2						1, 3
1.2	Clinical pharmacokinetics and pharmacodynamics of drugs	2			2			1-3
2	Clinical pharmacology of drugs							
2.1	Clinical pharmacology of antiallergic drugs	2	2					1, 3-5
2.2	Clinical pharmacology of antibacterial, antiviral, antifungal and antiprotozoal drugs	2			2			1-3
2.3	Clinical pharmacology of steroid and non-steroidal anti-inflammatory drugs, narcotic analgesics	2			2			1-3
2.4	Clinical pharmacology of drugs used in the respiratory system diseases		2		2			2-5
2.5	Clinical pharmacology of medicines used in cardiology	2	2					1, 3-5
2.6	Clinical pharmacology of medicines used in gastroenterology	2			2			1-3
2.7	Clinical pharmacology of drugs affecting the hemostatic system		2		2			2-5
2.8	Clinical pharmacology of anti-anemia drugs		2		2			2-5
2.9	Clinical pharmacology of medicines used for the treatment of type II diabetes and thyroid diseases	2			2			1-3
	Total	16	10		16			

INFORMATION AND INSTRUCTIONAL UNIT

The name of the topics of laboratory studies and their content

No.	Theme Title	Content	Volume, hour
1	2	3	4
1	Clinical pharmacokinetics and pharmacodynamics of drugs	Basic pharmacokinetic parameters. Bioavailability of drugs. Clinical pharmacodynamics and evaluation of its main parameters. Types of drug interactions. Peculiarities of pharmacokinetics and pharmacodynamics of medicines in elderly patients, women during pregnancy and lactation, patients with liver and kidney diseases. The choice of dosage regimen of the drug	2
2	Clinical pharmacology of antibacterial, antiviral, antifungal and antiprotozoal drugs	Classification of antifungal medicines for local and systemic use. Clinical pharmacology of the main groups of the drugs used to treat parasitic diseases. Modern principles of pharmacological therapy of the most common fungal and parasitic diseases	2
3	Clinical pharmacology of steroid and non-steroidal anti-inflammatory drugs, narcotic analgesics	Narcotic analgesics. Non-opioid medicines of central action with analgesic activity. Analgesics with the action mixed mechanism	2
4	Clinical pharmacology of drugs used in the respiratory system diseases	Clinical-pharmacological characteristics and features of the use of drugs for the basic anti-inflammatory therapy of bronchial asthma. Application of stabilizers of the mast cells membranes. Phytotherapy in pulmonology	2
5	Clinical pharmacology of medicines used in gastroenterology	Enzyme drugs of substitution therapy. The use of choleric drugs and hepatoprotectors. Antidiarrheal and laxative drugs. Drugs that regulate intestinal microbiocenosis. Phytotherapy of the digestive system diseases	2
6	Clinical pharmacology of drugs affecting the hemostatic system	Essential medicines used to reduce the activity of the blood coagulation system (proagregants, procoagulants, inhibitors of fibrinolysis), indications and contraindications to the use, methods of assessing the effectiveness	2

1	2	3	4
7	Clinical pharmacology of anti-anemia drugs	Clinical-pharmacological characteristics of anti-anemic drugs. Indications and contraindications to the use of iron-containing drugs and cyanocobalamin. Criteria for the effectiveness of ongoing pharmacological therapy	2
8	Clinical pharmacology of medicines used for the treatment of type II diabetes and thyroid diseases	Drugs for replacement therapy for hypothyroidism. Clinical-pharmacological characteristics of antithyroid drugs	2

Seminar (practical) classes, their content, volume in hours

No.	Theme Title	Content	Volume, hour
1	2	3	4
1	Clinical pharmacology of antiallergic drugs	Clinico-pharmacological characteristics of the main groups of antiallergic drugs. Anaphylaxis, medicinal anaphylactic shock. Clinical manifestation, diagnosis, and prevention of the drug anaphylactic shock. Prehospital and hospital stages of providing emergency medical care for anaphylactic shock	2
2	Clinical pharmacology of drugs used in the respiratory system diseases	Clinical-pharmacological characteristics of the antitussive drugs of central, peripheral, mixed effect. Expectorant and mucolytic drugs, especially their use. Drugs for the relief of bronchial obstructive syndrome (beta-2-adrenomimetics, M-cbolinoblockers, xanthines, combined drugs)	2
3	Clinical pharmacology of medicines used in cardiology	Clinical-pharmacological characteristics of anti-anginal and anti-ischemic drugs: beta-adrenoblockers, slow calcium channel blockers, nitrates, sydnonimines, and cardiac cytoprotectors. Medicines that correct lipid metabolism. Modern principles of the treatment of ischemic heart disease. Clinical-pharmacological characteristics of antiarrhythmic drugs, Vogen-Williams classification, mechanisms of antiarrhythmic action, indications and contraindications to their use, safety control. Medicines used in the treatment of disorders of the heart conduction system	2

1	2	3	4
4	Clinical pharmacology of drugs affecting the hemostatic system	The main causes leading to the function disruption of the blood coagulation and anticoagulation systems. Clinical-pharmacological characteristics of antiplatelet agents, direct and indirect anticoagulants, thrombolytic drugs	2
5	Clinical pharmacology of anti-anemia drugs	Classification of anemia. Iron deficiency, B ₁₂ - and folic deficiency anemia: etiology, clinical manifestations and principles of pharmacotherapy	2

The forms of knowledge control:

1. Conducting control work on the stream.
2. Interview to defend lab reports.
3. The decision of situational problems.
4. Writing Abstracts.
5. Certification for individual work.
6. Conducting an exam on the course.

Innovative approaches and methods to teaching academic discipline

When organizing the educational process, *a practice-oriented approach* is used, which involves:

- mastering the content of education through solving practical problems;
- acquisition of skills for the effective implementation of various types of professional activities;
- orientation to the generation of ideas, the implementation of group student projects;
- use of procedures, assessment methods, fixing the formation of professional competencies.

Teaching materials for the discipline

Literature

Basic (relevant)

1. Katzung, B. G. Basic and Clinical Pharmacology / B. G. Katzung. – 14th ed. – McGraw-Hill Education / Medical, 2017. – 1264 p.
2. Trevor A. J., Katzung B. G., Knudering-Hall M. Pharmacology Examination and Board Review. – 12th ed. – McGraw-Hill Education / Medical, 2019. – 585 p.
3. Ford S. M. Roach's introductory clinical pharmacology / S. M. Ford. – 11th ed. – Philadelphia : Wolters Kluwer, 2018. – 736 p.

4. Brunton L. L., Knollmann B. C., Hilal-Dandan R. Goodman and Gilman's the Pharmacological Basis of Therapeutics. – 13th ed. – McGraw-Hill Education / Medical, 2018. – 1440 p.

Additional

5. Tripathi, K. D. Pharmacological Classification of Drugs with Doses and Preparations / K. D. Tripathi. – 5th ed. – Jaypee Brothers Medical Publishers, 2014. – 226 p.

6. Tozer, T. N. Essentials of pharmacokinetics and pharmacodynamics / T. N. Tozer, R. Malcolm. – 2nd ed. – Lippincott Williams & Wilkins, 2016. – 352 p.

7. Lippincott's illustrated reviews: Pharmacology / Wh. Karen, editor; F. Carinda, editor; R. Rajan, editor. – 7th ed. – Wolters Kluwer, 2019. – 576 p.

8. Ford, S. M. Roach's introductory clinical pharmacology / S. M. Ford. – 11th ed. – Wolters Kluwer, 2018. – 720 p.

Internet Resources:

9. Republican formulary of medicines:

http://minzdrav.gov.by/lcfiles/000128_842637_PrikazMZ_N1519_2012.pdf;

http://minzdrav.gov.by/lcfiles/000128_211378_PrikazMZ_N257_2013_Formular.pdf.

10. Republican list of narcotic drugs, psychotropic substances and their precursors subject to state control in the Republic of Belarus – [http://www.pravo.by/pdf/2003-70/2003-70\(088-098\).pdf](http://www.pravo.by/pdf/2003-70/2003-70(088-098).pdf).

Regulations:

11. О лекарственных средствах : Закон Респ. Беларусь от 20.06.2006 № 161-3; в ред. Закона Респ. Беларусь от 15.06.2009 № 27-3; 22.12.2011 № 326-3; 17.11.2014 № 203-3; 29.06.2016 № 386-3.

12. О здравоохранении : Закон Респ. Беларусь, 18 июня 1993 г., № 2435-XII // Нац. реестр правовых актов Респ. Беларусь. 2008. № 159. 2/1460.

13. О мерах по снижению антибактериальной резистентности микроорганизмов : приказ Министерства здравоохранения Респ. Беларусь от 29.12.2015 № 1301.

Methodological recommendations on organization and implementation of the students' independent work

For the organization of independent work of students in the discipline, modern information technologies should be used: to place in the network access a set of educational and teaching materials (program, lecture course, multimedia presentations, guidelines for laboratory studies, a list of recommended literature and information resources, tasks in the test form for self-control, etc.).

Time allocated for independent work can be used by students to:

- preparation for the lectures and practical exercises;
- preparation for the exam in the academic discipline;
- study of topics (questions) taken for the independent study;

- performance of research assignments;
- preparation of thematic reports, abstracts, presentations;
- performance of practical tasks (expert evaluation of ongoing pharmacotherapy).

The main methods of independent work organization:

- the abstract writing and presentation;
- the report presentation;
- study of the topics and problems that are not addressed in the lecture;
- clinical analysis of the patients with ongoing pharmacotherapy evaluation and the card registration «Expert evaluation of pharmacotherapy»;
- computerized testing;
- preparation and participation in the education active forms.

Control of independent work can be carried out in the form of:

- control tests;
- discussion of abstracts;
- assessing the oral response to the question, the message, the report, the solution of situational problems in practical exercises;
- checking abstracts, test results;
- individual conversation.

It is advisable to check the effectiveness of students' independent work during the current and final control of knowledge. For a general assessment of the quality of assimilation by students of educational material, the use of a rating system is recommended.

The list of recommended diagnostic tools

For the intermediate and final certification of students, funds for diagnostic and evaluation tools, technologies and diagnostic techniques are being created.

The diagnostic process involves the use of the following forms:

1. Oral forms:

- case studies;
- interviews;
- seminar reports;

2. Written forms:

- filling out the card «Expert evaluation of the conducted pharmacotherapy»;
- test;
- abstracts;
- practical protocol;

3. Oral-written forms:

- solving situational problems;
- exam.

Evaluation Criteria

Criteria approved by the Ministry of Education of the Republic of Belarus are used to evaluate students' academic achievements.

The list of practical skills that a student should possess after mastering a discipline

- To identify groups of drugs for the treatment of a particular disease based on the mechanism of action of drugs, the state of body functions, age.
- To analyze the rationality of the choice according to the criteria of the effectiveness and safety of a particular drug in the group of analogues for the treatment of major diseases.
- Choose methods for monitoring the effectiveness and safety of the applied groups of drugs and assume the risk of developing undesirable drug reactions.
- Given the urgency of the condition and the main symptom complex, it is theoretically substantiated the rationality and necessity of the combined use of drugs, the correction of the dosage regimen when prescribing drugs of inducers and inhibitors of liver enzyme systems.
- Evaluate inter-drug interaction therapy.
- Calculate the main pharmacokinetic parameters of drugs.
- In case of combined pathology, justify the optimal dosage regimen, the choice of the dosage form of the drugs, the dose, frequency and duration of the administration of drugs.
- Selection of medicines taking into account the anatomical and physiological characteristics of the body (pregnancy, lactation, children, the elderly and senile).
- Evaluate the results of clinical trials of drugs published in medical journals.
- Have the skills to work with scientific literature in the field of pharmacology with the aim of organizing and planning a scientific experiment.

Sample topics of abstracts on the subject

1. Using the principles of evidence-based medicine in pharmacology.
2. The dependence of the effect of drugs on the dose used.
3. The dependence of the pharmacokinetics and pharmacodynamics of drugs on the genetic profile of the patient.
4. Gene therapy as a new direction in pharmacology.
5. Pharmacological characteristics of antioxidant agents.
6. Hypocholesterolemic agents.
7. Medicines used for cerebrovascular accident.
8. Medicines used for impaired peripheral circulation.
9. Comparative characteristics of analeptics, psychostimulants and antidepressants.

10. Acetylsalicylic acid (aspirin) and "aspirin asthma".
11. Complications of antibiotic therapy (allergic reactions, toxic effects of antibiotics).
12. The effect of mediator-type drugs on the psychophysiological state.
13. Gender differences in the treatment of chronic heart failure.
14. Nephroprotective drugs.
15. Treatment of myocardial infarction complicated by circulatory failure.
16. The role of β -blockers in the treatment of cardiovascular pathologies.
17. The effectiveness of hepatoprotectors in the treatment of liver cirrhosis.
18. Drug-induced mutagenesis.
19. Neuroprotective effect of vitamins.
20. Bronchodilator therapy for exacerbations of bronchial asthma.
21. Influenza: detoxification therapy.
22. New applications of interferon- β drugs.
23. Proton pump inhibitors.
24. Opioid Kappa receptor: molecular structure and function.
25. Antibiotic therapy of chronic obstructive pulmonary bronchitis.
26. The benefits of using angiotensin-II receptor antagonists in the treatment of hypertension.
27. The use of antihistamines in clinical practice.
28. The place of "triptans" in the treatment of migraine.
29. Analgesic therapy of inflammatory and degenerative joint diseases.

Questions for the exam

1. Clinical pharmacology as a discipline. Definition, goals, objectives, stages of development.
2. Nomenclature of medicinal products (international non-proprietary and trade names).
3. Clinical pharmacokinetics and pharmacodynamics of drugs.
4. Principles of the medicines development. Original and generic medicines.
5. Clinical trials of drugs.
6. Biological and therapeutic equivalence of drugs. Principles of the study of generic medicines bioequivalence. State registration of medicines.
7. Basic provisions of evidence-based medicine. The importance of evidence-based medicine principles for clinical practice.
8. Combined use of medicines. Types of drug interactions. Polypharmacy.
9. The principles of the use of drugs in women during pregnancy and lactation, elderly patients, patients with liver and kidney diseases.
10. Identify, register and prevent unwanted (adverse) reactions. Notification of suspected adverse reaction to the drug.
11. The development mechanism of immediate-type hypersensitivity reactions (urticaria, Quincke's edema, anaphylaxis, etc.).

12. Clinical manifestation, diagnosis, and prevention of the drug anaphylactic shock.
13. Prehospital and hospital stages of providing emergency medical care for anaphylactic shock.
14. Clinico-pharmacological characteristics of the main groups of antiallergic drugs.
15. Classification and clinical and pharmacological characteristics of penicillins.
16. Clinical and pharmacological characteristics of carbapenems.
17. Classification and clinical and pharmacological characteristics of cephalosporins.
18. Classification and clinical and pharmacological characteristics of macrolides.
19. Classification and clinical and pharmacological characteristics of aminoglycosides.
20. Classification and clinical and pharmacological characteristics of glycopeptides.
21. Classification and clinical and pharmacological characteristics of oxazolidinones.
22. Classification and clinical and pharmacological characteristics of tetracyclines.
23. Classification and clinical and pharmacological characteristics of nitroimidazoles.
24. Classification and clinical and pharmacological characteristics of fluoroquinolones.
25. Classification and clinical and pharmacological characteristics of nitrofurans.
26. Clinical and pharmacological characteristics of combined sulfanilamide drugs.
27. The tactics of choosing antimicrobial drugs for the treatment of infectious and inflammatory diseases of the respiratory system, taking into account the age characteristics of the patient, previous antibiotic therapy, the nature of the disease, the presence of concomitant diseases.
28. Antibiotic resistance of bacterial pathogens when using antimicrobial drugs, causes of formation, ways to overcome and prevention.
29. Principles of combined antibacterial therapy. Monitoring the effectiveness and safety of antibiotic treatment.
30. Classification of antiviral drugs. Clinical and pharmacological characteristics of influenza drugs, antiherpetic and antiretroviral drugs, interferons. Principles for the treatment of acute respiratory viral infections.
31. Classification of antifungal medicines for local and systemic use.
32. Clinical pharmacology of the main groups of the drugs used to treat parasitic diseases.
33. Clinical pharmacology of steroid drugs.

34. Clinical-pharmacological characteristics of non-steroidal anti-inflammatory drugs.
35. Clinical pharmacology of narcotic analgesics.
36. The tactics of using nonsteroidal anti-inflammatory and combined medicines for hyperthermic and pain syndrome.
37. Clinical pharmacology of drugs used for respiratory diseases.
38. Clinical and pharmacological characteristics of antitussive drugs of central, peripheral, mixed action.
39. Clinical and pharmacological characteristics of expectorant and mucolytic drugs, especially their use.
40. Clinical and pharmacological characteristics of medicines used to treat bronchial obstruction (beta-2-adrenergic agonists, M-anticholinergics, xanthines, combined medicines).
41. Clinical and pharmacological characteristics and characteristics of the use of drugs basic anti-inflammatory therapy of bronchial asthma. The use of mast cell membrane stabilizers.
42. Clinical-pharmacological characteristics of antihypertensive drugs. Principles of arterial hypertension modern pharmacotherapy.
43. Clinical-pharmacological characteristics of anti-anginal and anti-ischemic drugs: beta-adrenoblockers, slow calcium channel blockers.
44. Clinical-pharmacological characteristics of anti-anginal and anti-ischemic drugs: nitrates, sydnonimines, cardiac cytoprotectors.
45. Medicines that correct lipid metabolism.
46. Modern principles of the treatment of ischemic heart disease.
47. Clinical-pharmacological characteristics of antiarrhythmic drugs, Vogen-Williams classification, mechanisms of antiarrhythmic action, indications and contra-indications to their use, safety control.
48. Clinical-pharmacological characteristics of antisecretory drugs, antacids. Medicines that have a protective effect and enhance the regeneration of the gastrointestinal tract mucous membrane.
49. Diagrams of Helicobacter eradication. Classification of antiemetic drugs. Drugs affecting the motor function of the gastrointestinal tract.
50. Clinical and pharmacological characteristics of enzyme replacement therapy drugs.
51. Clinical and pharmacological characteristics of choloretic drugs and hepatoprotectors.
52. Clinical and pharmacological characteristics of drugs that regulate intestinal microbiocenosis.
53. Clinical and pharmacological characteristics of drugs for the treatment of chronic inflammatory bowel diseases.
54. Clinical and pharmacological characteristics of antiplatelet agents, thrombolytic drugs.
55. Clinical and pharmacological characteristics of direct and indirect anticoagulants.

56. Clinical and pharmacological characteristics of the main drugs used to reduce the activity of the blood coagulation system (aggregates, procoagulants, fibrinolysis inhibitors), indications and contraindications for use, methods for evaluating the effectiveness.

57. Clinical pharmacology of antianemic drugs: classification of anemia, iron deficiency, B₁₂- and folio deficiency anemia: etiology, clinical manifestations and principles of pharmacotherapy. Criteria for the effectiveness of pharmacological therapy.

58. Clinical pharmacology of drugs used to treat type II diabetes mellitus. Clinical and pharmacological characteristics of sulfonylureas, biguanides, meglitinides, thiazolidinediones and incretins.

59. Clinical and pharmacological characteristics of insulin preparations. Indications and contraindications, methods for monitoring the effectiveness and safety of insulin therapy.

60. Medicines for replacement therapy for hypothyroidism. Clinical and pharmacological characteristics of antithyroid drugs.

PROTOCOL OF THE CURRICULUM APPROVAL

Name of the discipline requiring approval	Department	Amendments to the curriculum of the academic discipline	Decision of the Department, which composed the curriculum (date, protocol No.)
Alignment with other disciplines is not required.			

Head of Department of Ecological Chemistry and Biochemistry _____ S. N. Shahab

ADDITIONS AND CHANGES TO THE EDUCATIONAL PROGRAM

на 20__ / 20__ учебный год

No.	Additions and changes	Base

The curriculum for the discipline «Clinical Pharmacology» was reviewed and approved at a meeting of Department of Ecological Chemistry and Biochemistry

(название кафедры)

(protocol No. ____ dated _____ 201__)

Head of the Department

(academic degree)

(signature)

(I.O. Surname)

APPROVED

Dean of the Faculty

(academic degree)

(signature)

(I.O. Surname)

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