MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

MINISTRY OF HEALTHCARE OF THE REPUBLIC OF UZBEKISTAN

TASHKENT STATE MEDICAL UNIVERSITY

«APPROVED»
Rector of Tashkent
State Medical University
Sh.A.Boymuradov
«28» 04 2025

Registered:
№ Bachelor's degree
D.-60910200; 1.2.15

MODULE PROGRAM

On Pharmacology

Area of knowledge:	900 000	- Healthcare and social affairs
Field of education:	910 000	- Healthcare
Direction of education:	60910200	- General medicine

Tashkent - 2025

Code of module FR15-606	Academic year 2025/2026	Semester 5-6	Credits 7
Module type Mandatory	**Language of study** English		**Number of hours per week** 4/3

1.	Module	Auditory lessons (hours)	Independent study (hours)	Total workload (hours)
	Pharmacology	105	105	210

2.

I. Module content

The purpose of teaching the module - in the process of training a family doctor, students are taught the groups of drugs, their mechanisms of action, the selection of therapeutic amounts depending on age, writing prescriptions for drug forms, ways of administration, instructions for use in diseases, side effects is to teach the secrets and cases of impossibility.

The function of the module - is to provide future family doctors with knowledge, skills and qualifications about drugs used in the treatment and prevention of various diseases; in the general prescription section of the module, the forms and preparation of medicinal substances, teaching the rules of prescription writing, in the general pharmacology section, the analysis of pharmacokinetics and pharmacodynamics of medicinal substances, in the special pharmacology section, teaching the nervous system, executive organs, and metabolism formation of skills related to the pharmacology of secretory, antimicrobial and antitumor substances. Knowing how to apply medical aid measures in case of drug poisoning, teaching how to use them in practice, how to change the pharmacokinetics and pharmacodynamics of drugs in children and the elderly under the influence of various factors, with the history of the development of the science of pharmacology in Uzbekistan and the achievements of pharmacologists consists of introduction.

II. The main theoretical part

II.I. The module includes the following topics:

5th and 6th Semesters:

Topic 1. General pharmacology. Pharmacokinetics and pharmacodynamics of drugs.

Introduction to the science of pharmacology, its history. Pharmacologists who made a great contribution to the development of the science of pharmacology in Uzbekistan. Basics of creating new drugs. Pharmacokinetic parameters of medicinal substances: ways of administration, distribution, decomposition and excretion. Pharmacodynamics of drugs. The main types of drug effects. Factors affecting the pharmacokinetics and pharmacodynamics of

drugs. Types of doses, width of therapeutic effect. The effect of sex, age and genetic factors on the effects of substances. The dependence of the effectiveness of the pharmacological effect on the pathological state of the organism. Effects of medicinal substances. Changes in the effect of drugs when they are re-introduced into the body. Mixed effects of drugs. Changes observed when drugs are administered together.

Topic 2. Efferent innervation. Medicines affecting cholinergic synapses.

M-, N-cholinomimetic agents. M-, N-cholinoblocking agents. Anticholinesterase agents. M-cholinomimetics. M-cholinoblocking agents. Mechanisms of their action, pharmacological properties, application, side effects, importance in medicine. Acute poisoning by organophosphorus compounds (FOB) and atropine-like substances and the drugs used in it and the measures to be taken.

Topic 3. Drugs that stimulate adrenergic synapses.

α-, β-adrenomimetic agents. Mainly α-adrenoceptor stimulants (α-adrenomimetics). Mainly β-adrenergic stimulating agents (β-adrenomimetics). Mechanisms of their action, pharmacological properties, use, side effects, contraindications.

Topic 4. Painkillers.

Centrally acting painkillers (narcotic analgesics). Opioid receptor agonists. Opioid receptor agonist-antagonists. Centrally acting non-opioid analgesics. Painkillers of different groups. Painkillers with a mixed mechanism of action (opioid + non-opioid). Medicines used in acute and chronic poisoning with morphine and measures to be taken. Their classification, mechanisms of action, pharmacological properties, use, side effects, contraindications, importance in medicine.

Topic 5. Neuroleptics. Anxiolytics.

Neuroleptics. Anxiolytics. Their classification, mechanisms of action, pharmacological properties, use, side effects, contraindications, importance in medicine.

Topic 6. Means affecting the activity of the respiratory system.

Respiratory stimulants. Antitussives. Expectorants. Broncholytic agents. Means used in the treatment of acute respiratory failure. Agents that increase the formation of surfactant. Their classification, mechanisms of action, pharmacological properties, application, side effects, importance in medicine.

Topic 7. Cardiotonic and antianginal agents.

Cardiac glycosides. Cardiotonic agents with non-glycoside structure. Their classification, mechanisms of action, pharmacological properties, application, side effects, importance in medicine. Poisoning from Angishvonagul (digitalis) drugs. Medicines and measures used in it. Medicines used in coronary insufficiency. Antianginal agents. Cardioprotectors. Medicines used in the treatment of myocardial infarction.

Topic 8. Hypotensive and hypertensive agents.

Hypotensive and hypertensive agents. Their classification, mechanisms of

action, pharmacological properties, application, side effects, importance in medicine.

Topic 9. Medicines affecting gastrointestinal and liver function.

Medicines used in case of malfunction of the stomach. Antacids. Gastroprotectors. Emetics and antiemetics. Hepatoprotectors: cholekinetic and choleretic agents. Medicines affecting intestinal peristalsis. Purgative drugs. Their classification, mechanisms of action, pharmacological properties, application, side effects, importance in medicine.

Topic 10. Medicines affecting the blood system.

Medicines that stimulate erythropoiesis. Medicines that stimulate leukopoiesis. Medicines affecting platelet aggregation, blood coagulation and fibrinolysis. Medicines used for the treatment and prevention of thrombosis: antiaggregants, direct and indirect anticoagulants, fibrinolytics. Hemostatic agents. Blood clotting agents. Antifibrinolytic drugs. Their classification, mechanisms of action, pharmacological properties, use, side effects, contraindications, importance in medicine.

Topic 11. Medicines affecting metabolism. Glucocorticoids. Anti-inflammatory drugs.

Glucocorticoids. Their classification, mechanisms of action, pharmacological properties, use, side effects, contraindications, importance in medicine. Anti-inflammatory drugs. Their classification, mechanisms of action, pharmacological properties, use, side effects, contraindications.

Topic 12. Antibiotics.

Basic principles of chemotherapy. Antibiotics: penicillins, cephalosporins. Macrolides and azalides. Aminoglycosides. Their classification, mechanisms of action, pharmacological properties, use, side effects, contraindications, importance in medicine.

III. Instructions and recommendations for practical (laboratory) training:

The following topics are recommended for practical training:

5th and 6th Semesters:

Topic 1. The importance of the recipe in the preparation of GP. Doses. Recipe and its structure. Solid and soft drug forms and rules for prescribing them.

Topic 2. Liquid drug forms and rules for prescribing them (Internal form).

Topic 3. Liquid drug forms and rules for prescribing them (External form).

Topic 4. General pharmacology. Pharmacokinetics and pharmacodynamics of drugs

Topic 5. Medicines affecting the afferent nervous system.

Topic 6. Medicines affecting M- and N- cholinergic receptors. Anticholinesterase agents. Means affecting M-cholinergic receptors.

Topic 7. Medicines affecting N-cholinerceptors.
Topic 8. Medicines that stimulate adrenoreceptors.
Topic 9. Drugs that paralyze adrenoreceptors.
Topic 10. Narcotics. Ethyl alcohol. Sleep aids.
Topic 11. Analgesics.
Topic 12. Neuroleptics. Anxiolytics
Topic 13. Psychostimulants. Antidepressants.
Topic 14. Medicines that affect the activity of respiratory organs.
Topic 15. Cardiotonics. Antiarrhythmic agents.
Topic 16. Antianginal agents.
Topic 17. Hypotensive agents. Hypertensive agents.
Topic 18. Medicines affecting the digestive system. Medicines affecting liver function. Hepatoprotectors.
Topic 19. Diuretics. Medicines affecting the muscles of the uterus.
Topic 20. Medicines affecting the blood system.
Topic 21. Hormonal drugs with protein and polypeptide structure. Hormonal preparations with a steroid structure.
Topic 22. Anti-inflammatory agents. Anti-allergic agents.
Topic 23. Antiseptic and disinfectants. Basic criteria and requirements of chemotherapy. Antibiotics Part I
Topic 24. Antibiotics Part II. Sulfanilamide drugs.
Topic 25. Anti-tuberculosis remedies, and anti-fungal agents
Topic 26. Antiviral.

General instructions and recommendations for organizing practical training:

Practical training is conducted by one teacher per academic group in an auditorium equipped with multimedia devices.

The following didactic principles are followed during practical training:

- To clearly define the purpose of practical training;

-Arouse students' interest in the possibilities of deepening knowledge on the teacher's innovative pedagogical activity;

- Provide the student with the opportunity to independently obtain the result;

- Theoretical and methodological preparation of the student, etc.

IV. Practical skills:

5th Semester:

1. During the module, students learn the basic laws of pharmacology, prescribing drugs for various diseases.

2. Will have the skills to calculate the appropriate doses and write a prescription for them. Pharmacokinetics and pharmacodynamics of drugs, instructions for use,

3. Side effects, drug interactions, precautions for the use of drugs depending on the activity of organs (biochemical indicators of the liver and kidneys), contraindications .

4. Learn the principles of first aid in acute and chronic drug poisoning.

6th Semester:

1. To be able to distinguish the drugs used in pathologies of executive organs (respiratory, cardiovascular, gastrointestinal, endocrine, blood system, infectious and non-infectious inflammation);

2. Mechanisms of action of drugs and specific characteristics of their types;

3. Being able to correctly choose the dose of medicines according to the patient's age (pediatric, geriatric indicators), gender, condition, daily life;

4. He should know how to correctly choose the ways of their introduction into the body according to the form of the medicine.

V. Independent education and independent work

Recommended topics for independent education

5th Semester:

1. Prescriptive laws and orders of the President of the Republic of Uzbekistan.

2. Regulatory documents used in drug control.

State Register of Medicines.

3. Pharmacology of Tropicamide drug.

4. Nicotinism and its complications. Effects of nicotinism on the body of adolescents and women.

5. Anaphylactic shock and its treatment.

6. Alcoholism and its complications. Effects of alcoholism on the fetus.

7. Drug addiction and its complications.

8. Phytopreparations and their use.

9. Medicines used in the treatment of Parkinson's disease.

10. Anti-epileptic drugs.

11. Lithium salts. Sedatives

12. Nootropics. Analeptics.

13. Dopamine and dopaminergic agents. Serotonin and serotonergic agents.

	6th Semester: 1. Medicines used in hypertensive crisis. 2. Means affecting liver function. Hepatoprotectors. Hepatoprotective agents used in the treatment of hepatitis caused by drugs. 3. Medicines that increase the tone of the human body. Agents affecting immunity. 4. Hyperthermia syndrome and drugs used in its treatment. 5. Pharmacodynamics of Torasemide drug. 6. Effects of drugs on the fetus. 7. Synthetic antibacterial agents with different chemical structures. Representatives of the new generation of cephalosporin antibiotics. 8. Medicines affecting the immune system Vitamins. 9. A drug used in the treatment of diabetes insipidus 10. Comparative analysis of iron-sparing drugs 11. Simple insect repellants. Animal repellants for worms. 12. Means against dangerous tumors. 13. Medicines affecting leukotriene receptors.
3.	**VI. Educational results/professional competencies** **The student should know:** **At the end of the 5th semester:** • classification groups of drugs, • names of drugs included in the groups, • mechanism of action, types of action, • to have an idea about special instructions for age, measures and methods of assistance provided in case of drug poisoning; (knowledge) • basic rules of the general recipe, • to be able to write prescriptions for different forms of medicine (liquid, soft, solid and inhaled). • the basics of pharmacokinetics and pharmacodynamics of drugs, • instructions for the use of drugs, • side effects and contraindications for use, • new analogues of drugs, • symptoms of acute poisoning with drugs, • classification of drugs, • to know the characteristics, classification, indications and contraindications of drugs affecting the peripheral nervous system, the rules of prescribing them, • to know the characteristics, classification, indications and

	contraindications of drugs affecting the central nervous system, the rules of prescribing them, • know and be able to use the comparative evaluation of drugs of the pharmacotherapeutic group and measures to prevent side effects; (skill) • the activity of medicinal substances, • their pharmacological properties, • be able to analyze taking into account the mechanism of action, • correctly identify groups of drugs, • dosage of medicines depending on the age of the patient, • to determine ways to introduce drugs, • to be able to determine the correct choice of drugs and their therapeutic effect in situational issues, • mastering the rules of prescription writing, • should have the skills to write prescriptions for different forms of various drugs and prepare them. (qualification) **The student should know:** **At the end of the 6th semester:** • able to analyze the activity of medicinal substances, taking into account their pharmacological properties, mechanism of action, • correctly identify groups of drugs, • dosage of medicines depending on the age of the patient, • to determine ways to introduce drugs, • to be able to determine the correct choice of drugs and their therapeutic effect in situational issues, • to be able to write prescriptions for different forms of various drugs and to have an idea about their preparation; (knowledge) • specific characteristics of drugs affecting executive organs (respiratory, cardiovascular, gastrointestinal, endocrine, blood system, infectious and non-infectious inflammation), • the basics of pharmacokinetics and pharmacodynamics of drugs, • classification of drugs, • instructions for the use of drugs, • side effects and contraindications for use, • new analogues of drugs, • symptoms of acute poisoning with drugs, • to know the rules of writing a prescription and be able to use them; (skill) • to be able to distinguish the drugs used in pathologies of executive organs (respiratory, cardiovascular, gastrointestinal, endocrine, blood system, infectious and non-infectious inflammation) • specific characteristics of the pharmacodynamics of drugs, • to be able to correctly calculate the dose of drugs according to the age

	and gender of the patient • should have skills such as ways of introducing them into the body according to the form of the drug. (qualification)
4.	**VII. Educational technologies and methods** • Interactive games; • Seminar (logical thinking, quick questions and answers; • Work in groups; • Introduction of presentations; • Individual projects; • Projects for teamwork and advocacy.
5.	**VIII. Requirements for obtaining credits:** Completion of tasks and tasks given in the form of current control, successful submission of written work on the types of intermediate and final control.
6.	**Main literature:** 1. Karen Whalen. Pharmacology. Textbook. «Lippincott illustrated reviews», 6th edition, 2015. 2. Allaeva M.J., Xakimov Z.Z., Ismailov S.R., Aminov S.S., Mustanov B.T. Pharmacology. 2020. (e-book). 3. D.A. Kharkovich. Pharmacology. Textbook. Moscow, 2017. 4. Azizova S.S. Pharmacology. Volume 2006. 5. Maxsumov M.N. Pharmacology. Volume 2006. 6. Sh.Z. Umarova and others. Medical and pharmaceutical partnership. Handbook. 2017. (in Latin script). 7. Kharkovich D.A. Pharmacology. Textbook- 2010, Moscow "Medicine" – 750 pages. 8. Manuchair Ebadi. Pharmacology. Textbook. 3rd edition, Boston New York Toronto London, 1996. 9. Vidal. Medicinal preparations in Uzbekistan. Directory. 2010, Moscow: AstraFarmService. 10. Aliev X.U., M.J. Allaeva. Clinical pharmacy. Textbook. T., 2011. 11. Khakimov Z.Z., Mustanov T.B., Payzieva L.A. Antibacterial agents. Handbook, Tashkent, 2016. 12. Aminov S.D., Ziyaeva Sh.T., Karimova G.A., Mirzaakhmedova K.T., Kaldibaeva A.O. General prescription. Handbook, "Science and Technology"

	publishing, Tashkent, 2015. **Websites:** 1. www.evrofarm.uz 2. http://evbmed.fbm.msu.ru/ Moscow Center for Evidence-Based Medicine 3. http://www.fda.gov U.S. Food and Drug Administration (FDA) 4. http://www.pharmgkb.org/ Pharmacogenetics resource. 5. http://www.tga.health.gov.au/adr/aadrb.htm Australian Adverse Drug Reactions Bulletin 6. http://www.mhra.gov.uk/Publications/Safetyguidance/DrugSafetyUpdate/index.htm British Monthly Medicines Safety Bulletin 7. http://www.drugreg.ru Pharmaceutical Information Foundation 8. http://www.rlsnet.ru Russian Encyclopedia of Medicines (REM) 9. http://nmu-student.narod.ru/farmacology
7.	**Developed and approved by the Tashkent State Medical University.** The curriculum of the module is approved by the order of the Tashkent State Medical University dated 5 "06", 2025 (Annex 128 of the order). Head of the educational and methodological department F.Kh. Azizova
8.	**Responsibles for the module:** **M.J.Allaeva** - head of the "Pharmacology" department, doctor of biological sciences, Tashkent State Medical University **J.A.Kholmatov** - teacher assistant of the "Pharmacology" department, Tashkent State Medical University **S.A.Sultanov** - teacher assistant of the "Pharmacology" department, Tashkent State Medical University
9.	**Reviewers:** **Internal reviewer:** **A.X.Rakhmonov** – Researcher of the Biomedical Research Center, doctor of medical sciences, Tashkent State Medical University **External reviewer:** **Z.T.Fayziyeva** – Doctor of Medical Sciences, Professor of the Department of Pharmacology and Clinical Pharmacy of Tashkent Pharmaceutical Institute.