

MINISTRY OF HEALTH OF UKRAINE
BUKOVINIAN STATE MEDICAL UNIVERSITY

"APPROVE"

Vice-rector for scientific and pedagogical work
Associate Professor _____ Igor GERUSH

"06" _____ 09 _____ 2021

STUDENT GUIDE
(SYLLABUS)
of studying the discipline
«PHARMACOLOGY»

Field of knowledge 22 Healthcare
(code and name of the field of knowledge)

Specialty 222 Medicine
(code and name of the specialty)

Educational degree Master
(master, bachelor, junior bachelor)

Educational year 3

Form of study full-time
(full-time, part-time, distance)

Department pharmacology
(name of the department)

Approved at the methodical session of the department of pharmacology
"15" 06 2021 (Protocol №15).

Head of the Department _____ Igor ZAMORSKII
(signature)

Approved by the subject methodical commission for medical biological disciplines of the
physiological and physical/chemical profile
"30" 08 2021 (Protocol №1).

Chairman of the subject methodical
commission _____ Svitlana TKACHUK
(signature)

Chernivtsi – 2021

1. GENERAL INFORMATION ABOUT SCIENTIFIC AND PEDAGOGICAL STAFF WHO TEACH THE SUBJECT

Department	Pharmacology
Surname, name of scientific and pedagogical staff, scientific degree, academic status	Shchudrova Tetiana – PhD, associate professor shchudrova.tetiana@bsmu.edu.ua Drachuk Vira – PhD, associate professor drachuck.vira@bsmu.edu.ua Novychenko Svitlana – PhD, assistant novychenko.s@bsmu.edu.ua
Web page of the department on the official website of the university	https://www.bsmu.edu.ua/farmakologiyi/
Department website	http://pharmacology.bsmu.edu.ua/
E-mail	pharmacology@bsmu.edu.ua
Address	Chernivtsi, Popovycha str., 17
Contact phone	+38 (0372) 53-52-62

2. GENERAL INFORMATION ABOUT THE DISCIPLINE

Status of the discipline	normative
Number of credits	7
Total amount of hours	210
Lectures	30
Practical lessons	70
Individual work	110
Type of final control	final module control

3. DESCRIPTION OF THE DISCIPLINE (ABSTRACT)

Pharmacology is a branch of science that deals with the study of drugs and their actions on living systems. Medical pharmacology is defined as the science of substances used to prevent, diagnose, and treat disease. Pharmacology focuses on classification and main characteristics of drugs, their mechanism of action, clinical uses, adverse effects, important drug-drug interactions and contraindications.

4. POLICY OF THE SUBJECT

4.1. List of normative documents:

- Regulations on the organization of the educational process (<https://www.bsmu.edu.ua/wp-content/uploads/2020/03/polozhennya-pro-organizacziyu-osvitnogo-proczesu-u-vdnzu-bukovinskij-derzhavnij-medichnij-universitet.pdf>);
- Instructions for assessing the educational activities of BSMU students in the implementation of the European credit transfer system of the educational process (<https://www.bsmu.edu.ua/wp-content/uploads/2020/03/bdmu-instrukcziya-shhodo-oczinyuvannya-%D1%94kts-2014-3.pdf>);
- Regulations on the procedure for reworking missed and uncredited classes (<https://www.bsmu.edu.ua/wp-content/uploads/2019/12/reworks.pdf>);
- Regulations on the appeal of the results of the final control of knowledge of higher education (<https://www.bsmu.edu.ua/wp-content/uploads/2020/07/polozhennya-pro-apelyacziyu-rezultativ-pidsumkovogo-kontrolyu-znan.pdf>);
- Codex of Academic Integrity (https://www.bsmu.edu.ua/wp-content/uploads/2019/12/kodeks_academic_faith.pdf);
- Moral and ethical codex of students (https://www.bsmu.edu.ua/wp-content/uploads/2019/12/ethics_code.docx);

- Regulations on the prevention and detection of academic plagiarism (<https://www.bsmu.edu.ua/wp-content/uploads/2019/12/antiplagiat-1.pdf>);
 - Regulations on the procedure and conditions for students to choose elective courses (https://www.bsmu.edu.ua/wp-content/uploads/2020/04/nakaz_polozhennyz_vybirkovi_dyscypliny_2020.pdf);
 - Rules of internal labor regulations of the Higher State Educational Institution of Ukraine "Bukovinian State Medical University" (<https://www.bsmu.edu.ua/wp-content/uploads/2020/03/17.1-bdmu-kolektivnij-dogovir-dodatok.doc>).
- 4.2. **Policy on adherence to the principles of academic integrity of higher education students:**
- independent performance of educational tasks of current and final controls without the use of external sources of information;
 - cheating during control of knowledge is prohibited;
 - independent performance of individual tasks and correct registration of references to sources of information in case of borrowing of ideas, statements, information.
- 4.3. **Policy on adherence to the principles and norms of ethics and deontology by higher education students:**
- actions in professional and educational situations from the standpoint of academic integrity and professional ethics and deontology;
 - compliance with the rules of internal regulations of the university, to be tolerant, friendly and balanced in communication with students and teachers, medical staff of health care institutions;
 - awareness of the importance of examples of human behaviour in accordance with the norms of academic integrity and medical ethics.
- 4.4. **Attendance policy for higher education students:**
- attendance at all training sessions (lectures, practical (seminar) classes, final modular control) is mandatory for the purpose of current and final assessment of knowledge (except for respectable reasons).
- 4.5. **Deadline policy and completion of missed or uncredited classes by higher education students:**
- reworks of missed classes are held according to the schedule of missed or uncredited classes and consultations.

5. PRECISIONS AND POST-REQUIREMENTS OF THE EDUCATIONAL DISCIPLINE (INTERDISCIPLINARY RELATIONS)

List of disciplines, on which the study of academic discipline is based	List of academic disciplines, for which the basis is laid as a result of studying the discipline
Human Anatomy	Internal Medicine
Human Physiology	Clinical Pharmacology
Medical Biology	Surgery
Medical Chemistry	Pediatrics
Biochemistry	
Microbiology	
Pathology	

6. PURPOSE AND TASKS OF THE EDUCATIONAL DISCIPLINE:

6.1. **The purpose of studying the discipline** is to provide fundamental knowledge of the rational and scientific basis of therapeutics and general principles underlying the use of pharmacological agents in the practice of medicine. A secondary objective is to provide the opportunity for students to develop the skills needed to acquire and critically evaluate therapeutically relevant details of an ever-increasing number of pharmacological agents, advances in biomedical sciences, and evolving concepts of acceptable medical practice throughout their professional career.

6.2. The main tasks of studying the discipline are:

- gaining the complex knowledge of the basic pharmacological concepts, principles of rational drug therapy, pharmacology of drugs affecting the peripheral and central nervous system, cardiovascular system, drugs used in respiratory and gastrointestinal disorders, disorders of blood, pharmacology of anticancer and antimicrobial agents;
- study and evaluation of pharmacodynamic and pharmacokinetic parameters of drugs;
- mastering the methodology of comparative evaluation of different drugs;
- mastering the general methodology for selecting the optimal drug, its dose, route of administration and dosage regimen for a particular patient for effective and safe drug therapy, taking into account the patient's condition;
- mastering the principles of drug interaction;
- study the adverse effects of drugs, factors that increase the risk of their development, methods for prevention and correction;
- mastering the methods and criteria for assessing the effectiveness and safety of specific drugs in the treatment of various diseases;
- mastering the skills of obtaining and analysis of the pharmacological properties of drugs;
- gaining the knowledge of the poisonings, management of poisoned patient, common toxidromes, and pharmacology of antidotes.

7. COMPETENCIES, THE FORMATION OF WHICH IS CONTRIBUTED BY THE DISCIPLINE:

7.1. Integral competence:

Ability to solve typical and complex specialized and practical problems in the professional activity of a doctor using the provisions, theories and methods of basic, chemical, technological, biomedical and socio-economic sciences; integrate knowledge and solve complex issues, formulate judgments on insufficient or limited information; clearly and unambiguously communicate their conclusions and knowledge, reasonably substantiating them, to the professional and non-professional audience.

7.2. General competencies:

GC1 Abstract thinking, analysis and synthesis, the ability to learn and train.

GC2 Ability to apply knowledge in practical situations.

GC3 Knowledge and understanding of professional activity.

GC4 Ability to adapt and act in a new situation.

GC5 Ability to make an informed decision, interpersonal and communication skills.

GC6 Knowledge and understanding of the subject area and profession.

GC9 Ability to act socially responsibly and consciously.

7.3. Professional (special) competencies:

PC6 Ability to determine the principles and nature of treatment of diseases. To determine the principles of treatment of the disease in the health care facility, at the patient's home and at the stages of medical evacuation, including in the field, on the basis of a preliminary clinical diagnosis, using knowledge about the person, his organs and systems, adhering to the relevant ethical and legal norms, by making an informed decision according to existing algorithms and standard schemes.

PC9 Emergency care skills. Provide emergency medical care using knowledge of the person, his organs and systems, adhering to the relevant ethical and legal norms, by making an informed decision, based on the diagnosis of emergency in a limited time in accordance with certain tactics, using standard schemes.

8. RESULTS OF STUDYING THE DISCIPLINE.

As a result of studying the discipline student must:

8.1. Know:

- The main ways of pharmacological correction of disorders and diseases of different organ systems.
- Nomenclature and classification of drugs.
- Pharmacokinetics and pharmacodynamics of essential and commonly used drugs.
- Indications, contraindications, interactions and adverse reactions of commonly used drugs.
- Manifestations of possible side effects and symptoms of overdose, methods of prevention and treatment.
- Rules for prescribing drugs in various dosage forms.
- Use of the appropriate drug in a particular disease with consideration of its cost, efficacy and safety for individual needs.
- Pharmacological basis of prescribing drugs in special medical situations such as pregnancy, lactation, infancy and old age.
- Pharmacokinetic basis, clinical presentation, diagnosis and management of common poisonings.

8.2. Be able to:

- To determine the group affiliation of drugs according to modern classifications
- Describe the pharmacokinetics and pharmacodynamics of essential and commonly used drugs.
- List the indications, contraindications, interactions and adverse reactions of commonly used drugs.
- Justify the main indications for use, adequate dosage form, routes of administration and interaction with other drugs.
- Identify the manifestations of possible side effects and symptoms of overdose, methods of prevention and treatment.
- Assess the benefit / risk ratio of drug use.
- Indicate the use of the appropriate drug in a particular disease with consideration of its cost, efficacy and safety for individual needs.
- Describe the pharmacokinetic basis, clinical presentation, diagnosis and management of common poisonings.
- Integrate the list the drugs of addiction and recommend the management.
- Explain pharmacological basis of prescribing drugs in special medical situations such as pregnancy, lactation, infancy and old age.
- Describe the pharmacokinetic basis, clinical presentation, diagnosis and management of common poisonings;
- Apply basic principles of pharmacology and therapeutics to practice rational use of existing drugs and evaluation of new drugs;
- Prescribe drugs, taking into account the patient's condition, comorbidities, indications for use of the drug.

8.3. Demonstrate:

- the knowledge of the pharmacodynamics and pharmacokinetics of drugs;
- the ability to choose the optimal drug, its dose, route and regimen of administration for a particular patient for effective and safe drug therapy, taking into account the patient's condition;
- the understanding of the basic principles of pharmacology and therapeutics to practice rational use of existing drugs and evaluation of new drugs.

9. INFORMATIONAL SCOPE OF THE DISCIPLINE

Module 1. MEDICAL PRESCRIPTIONS. GENERAL PHARMACOLOGY.

PHARMACOLOGY OF DRUGS AFFECTING THE NERVOUS SYSTEM AND METABOLISM.

Content module 1. MEDICAL PRESCRIPTIONS

Introduction: definition, historical perspective, branches and scope of the subject of pharmacology and its relation with other medical disciplines. Nature and sources of Drugs, Drug nomenclature and dosage forms. Routes of drugs' administration; advantages and disadvantages of different routes. Concept of evidence-based medicine, essential medicines, and rational prescribing. Development of new drugs: pre-clinical and clinical phases of drug evaluation. Prescription writing

Topic 1. Introduction to medical prescriptions. Solid dosage forms.

Topic 2. Semi-solid dosage forms

Topic 3. Liquid dosage forms

Topic 4. Final test on medical prescriptions

Content module 2. GENERAL PHARMACOLOGY

Topic 5. Pharmacokinetics

Pharmacokinetic considerations: drug absorption, distribution, biotransformation and excretion. Pharmacokinetic concepts of bioavailability, apparent volume of distribution (aVd), half-life ($t_{1/2}$), and clearance (CL) that are used to decide the doses and rational dosing during the drug treatment.

Topic 6. Pharmacodynamics

Pharmacodynamics; site and mechanism of drug action, drug receptors and receptor regulation, concepts of agonists, antagonists, partial agonist and inverse agonist drugs. Quantitative aspect of drug action: analysis of dose response curve and therapeutic index (safety index). Factors affecting drug action and doses, how to prolong or shorten the drug action and effects. Drug interactions and concept of pharmacogenomics/-genetics in drug action, effects and ADRs. Adverse drug reactions (ADRs) and role of pharmacovigilance activity in ADR monitoring.

Content module 3. PHARMACOLOGY OF DRUGS AFFECTING THE PERIPHERAL NERVOUS SYSTEM

Topic 7. Drugs affecting afferent innervations. Local anaesthetics.

Topic 8. Drugs acting on ANS. Cholinergic agonists

Introduction to Pharmacology of ANS. Cholinergic drugs: cholinoreceptor agonist and cholinesterase inhibiting drugs.

Topic 9. Drugs acting on ANS. Cholinergic blockers

Anticholinergic drugs: cholinoreceptor-blocking agents

Topic 10. Drugs acting on ANS. Adrenergic agonists

Adrenergic drugs: adrenoceptor agonist and sympathomimetic drugs

Topic 11. Drugs acting on ANS. Adrenergic blockers

Content module 4. PHARMACOLOGY OF DRUGS AFFECTING THE CENTRAL NERVOUS SYSTEM

Topic 12. General anaesthetics

General anaesthetics with preanesthetic medications

Topic 13. Pharmacology of analgesia

Opioid analgesic and antagonists

Topic 14. Sedative-hypnotic-anxiolytic drugs. Anticonvulsants

Introduction and basic concepts of drugs affecting CNS activity: Neurotransmitters and their pathways and important sites of Central Nervous System effect of drugs. Sedative-hypnotic drugs. Antianxiety drugs. Antiepileptic drugs.

Topic 15. Antipsychotics. Drugs used in Parkinson's disease and movement disorders
Antipsychotic/Neuroleptic drugs. Antiparkinsonian drugs and drugs for other neurodegenerative and movement disorders

Topic 16. Antidepressants. CNS stimulants

Antidepressant and anti-mania drugs. Pharmacology of ethyl alcohol and other alcohols. Pharmacology of CNS stimulants, psychomimetic drugs, drug dependence and substance abuse

Content module 5. PHARMACOLOGY OF DRUGS AFFECTING METABOLISM.

ANTICANCER DRUGS

Topic 17. Endocrine drugs

Pharmacology of pituitary and hypothalamic hormones. Thyroid hormones and antithyroid drugs. Drugs for diabetes mellitus: Insulin and oral antidiabetic agents. Adrenocorticosteroids. Estrogens, progesterone and inhibitors. Oral contraceptives & HRT

Topic 18. Anti-inflammatory drugs. Drugs acting on immune system

Prostaglandins & Leukotrienes, Histamine & H1 blockers, 5-HT agonists & antagonists. NSAIDs. Drug treatment of rheumatoid arthritis & other autoimmune diseases. Antihistamines. Immunosuppressants and immunomodulators.

Topic 19. Anticancer drugs.

Basic principles of cancer chemotherapy. Pharmacology of anticancer drugs. Problems associated with chemotherapy.

Module 2. PHARMACOLOGY OF DRUGS AFFECTING MAJOR ORGAN SYSTEMS.

PHARMACOLOGY OF ANTIMICROBIAL DRUGS.

TREATMENT OF ACUTE POISONINGS

Content module 6. DRUGS AFFECTING MAJOR ORGAN SYSTEMS

Topic 21. Drugs for disorders of the respiratory system

Antitussives, expectorants, mucolytics. Drug treatment of bronchial asthma, COPD.

Topic 22. Cardiovascular drugs. Antiarrhythmics. Drugs for heart failure

Digitalis & drug therapy of CHF. Antiarrhythmic drugs.

Topic 23. Drugs for coronary heart disease. Antianginal Drugs. Antihyperlipidemics

Antianginal drugs – nitrates, beta-blockers, calcium channel blockers and potassium channel openers. Treatment of angina. Drug therapy of myocardial infarction & peripheral vascular diseases. Antihyperlipidemic Drugs.

Topic 24. Antihypertensive drugs

General considerations and classification of antihypertensives. Central sympatholytics, ganglionic blockers, adrenergic neuron blockers & catecholamine depletors, alpha & beta adrenoceptor blockers, vasodilators, ACE inhibitors & angiotensin AT2 receptor antagonists, Drug therapy of hypertension.

Topic 25. Diuretics

General considerations & classification of diuretics, thiazide diuretics, loop diuretics, carbonic anhydrase inhibitors & osmotic diuretics, potassium sparing diuretics. Complications of diuretic therapy & use of diuretics in non-edematous disorders.

Topic 26. Drugs used in blood disorders

Antithrombotic drugs. Coagulants & anticoagulants, fibrinolytics & antifibrinolytics, Antiplatelet drugs. Treatment of Iron deficiency anemia, treatment of megaloblastic anemia. Plasma expanders.

Topic 27. Drugs used in gastrointestinal dysfunction

Drugs for gastric acidity, peptic ulcer & GERD. Antiemetic and prokinetic agents. Drugs for constipation and Inflammatory Bowel Disease. Antidiarrheal agents.

Content module 7. ANTIMICROBIAL DRUGS

Topic 28. Antiseptics and disinfectants. Synthetic chemotherapeutic drugs
Introduction and basic principles of chemotherapy of infection, infestation and neoplastic diseases and concepts of resistance to chemotherapeutic agents. Sulfonamides & Cotrimoxazole, Quinolones

Topic 29. Antibiotics. Cell wall synthesis inhibitors. DNA synthesis inhibitors
Principles of antimicrobial therapy. β -lactam antibiotics, Penicillins & Cephalosporins

Topic 30. Antibiotics. Protein synthesis inhibitors. Antitubercular drugs
Tetracyclines, Chloramphenicol, Aminoglycoside antibiotics, Macrolides, chemotherapy of urinary tract infections, chemotherapy of sexually transmitted diseases. Chemotherapy of tuberculosis.

Topic 31. Antifungal drugs. Antiviral drugs

Topic 32. Antiprotozoal drugs. Anthelmintic drugs

Antimalarial drugs & Chemotherapy of malaria, Antiamoebic drugs & Chemotherapy of amoebiasis & Other Protozoal diseases, Anthelmintics.

Content module 8. TREATMENT OF ACUTE POISONINGS

Topic 33. Poisoning and toxidromes. Pharmacology of antidotes

Clinical Toxicology. Management of the poisoned patient. Common Toxidromes. Pharmacology of Antidotes.

10. STRUCTURE OF EDUCATIONAL DISCIPLINE

Names of content modules and topics	Amount of hours				
	Total	including			
		Classroom		Independent students' work	Individual work
Lectures	Practicals				
1	2	3	4	5	6
Module 1					
MEDICAL PRESCRIPTIONS					
GENERAL PHARMACOLOGY					
PHARMACOLOGY OF DRUGS AFFECTING THE NERVOUS SYSTEM AND METABOLISM					
Content module 1. MEDICAL PRESCRIPTIONS					
Topic 1. Introduction to medical prescriptions. Solid dosage forms	3	0	2	1	
Topic 2. Semi-solid dosage forms	3	0	2	1	
Topic 3. Liquid dosage forms	3	0	2	1	
Topic 4. Final test on medical prescriptions	3	0	2	1	
Total on the content module 1	12	0	8	4	
Content module 2. GENERAL PHARMACOLOGY					
Topic 1. Pharmacokinetics	5	1	2	2	
Topic 2. Pharmacodynamics	5	1	2	2	
Total on the content module 2	10	2	4	4	
Content module 3. PHARMACOLOGY OF DRUGS AFFECTING THE PERIPHERAL NERVOUS SYSTEM					
Topic 1. Drugs affecting afferent innervations	4	0	2	2	
Topic 2. Drugs acting on ANS. Cholinergic agonists	5	1	2	2	

Topic 3. Cholinergic blockers	5	1	2	2	
Topic 4. Adrenergic agonists	5	1	2	2	
Topic 5. Adrenergic blockers	5	1	2	2	
Total on the content module 3	24	4	10	10	
Content module 4. PHARMACOLOGY OF DRUGS AFFECTING THE CENTRAL NERVOUS SYSTEM					
Topic 1. General anaesthetics	2	0	2	2	
Topic 2. Pharmacology of analgesia	8	2	2	4	
Topic 3. Sedative-hypnotic-anxiolytic drugs. Anticonvulsants	4	1	2	2	
Topic 4. Antipsychotics. Drugs used in Parkinson's disease and movement disorders	5	1	2	2	
Topic 5. Antidepressants. CNS stimulants	5	0	2	2	
Total on the content module 4	24	4	10	12	
Content module 5. PHARMACOLOGY OF DRUGS AFFECTING METABOLISM ANTICANCER DRUGS					
Topic 1. Endocrine drugs	6	2	2	2	
Topic 2. Anti-inflammatory drugs. Drugs acting on immune system	8	2	2	4	
Topic 3. Anticancer drugs	4	0	2	2	
Total on the content module 5	18	4	6	8	
Final module control	2		2		
TOTAL HOURS Module 1	104	14	40	50	
Module 2 PHARMACOLOGY OF DRUGS AFFECTING MAJOR ORGAN SYSTEMS PHARMACOLOGY OF ANTIMICROBIAL DRUGS TREATMENT OF ACUTE POISONINGS					
Content module 6. DRUGS AFFECTING MAJOR ORGAN SYSTEMS					
Topic 1. Drugs for disorders of the respiratory system	4	0	2	2	
Topic 2. Antiarrhythmics. Drugs for heart failure	4	1	2	2	
Topic 3. Antianginal drugs. Antihyperlipidemic drugs	6	2	2	2	
Topic 4. Antihypertensive drugs	6	2	2	2	
Topic 5. Diuretics. Drugs for gout	6	1	2	2	
Topic 6. Drugs used in blood disorders	6	2	2	2	
Topic 7. Drugs used in gastrointestinal dysfunction	6	2	2	2	
Total on the content module 6	38	10	14	14	
Content module 7. ANTIMICROBIAL DRUGS					
Topic 1. Synthetic chemotherapeutic drugs	8	2	2	4	
Topic 2. Antibiotics. Cell wall synthesis inhibitors. DNA synthesis inhibitors	5	1	2	2	

Topic 3. Antibiotics. Protein synthesis inhibitors. Antitubercular drugs	5	1	2	2	
Topic 4. Antifungal drugs. Antiviral drugs	4	2	2	2	
Topic 5. Antiprotozoal drugs. Antihelmintic drugs	4	0	2	2	
Total on the content module 7	28	6	10	12	
Content module 8. TREATMENT OF ACUTE POISONINGS					
Topic 1. Poisoning and toxidromes. Pharmacology of antidotes	8	0	2	10	
Topic 2. Final on-line testing	8	0	2	10	
Total on the content module 8	16	0	4	20	
Individual work (if present)					
Final module control	2		2		
TOTAL HOURS Module 2	106	16	30	60	
TOTAL HOURS	210	30	70	110	

11. THEMATIC PLAN OF LECTURES

Nº	Name of topic	Amount of hours
1	General pharmacology	2
2	Drugs affecting ANS. Cholinergic drugs	2
3	Drugs affecting ANS. Adrenergic drugs	2
4	Analgesics	2
5	Drugs affecting CNS	2
6	Endocrine drugs	2
7	Anti-inflammatory and immunotropic drugs	2
8	Cardiovascular drugs-I	2
9	Cardiovascular drugs-II	2
10	Cardiovascular drugs-III	2
11	Drugs used in blood disorders	2
12	Drugs used in GIT disorders	2
13	Antibiotics-I	2
14	Antibiotics-II	2
15	Antifungal drugs. Antiviral drugs	2
	Total	30

12. THEMATIC PLAN OF PRACTICAL (SEMINAR) CLASSES

Nº	Name of topic	Amount of hours
1	Introduction to medical prescriptions. Solid dosage forms	2
2	Semi-solid dosage forms	2
3	Liquid dosage forms	2
4	Final test on medical prescriptions	2
5	General pharmacology-I. Pharmacokinetics	2
6	General pharmacology-II. Pharmacodynamics	2
7	Drugs affecting afferent innervations. Local anaesthetics.	2
8	Drugs acting on ANS. Cholinergic agonists	2

9	Cholinergic blockers	2
10	Adrenergic agonists	2
11	Adrenergic blockers	2
12	Drugs acting on CNS. General anaesthetics.	2
13	Pharmacology of analgesia	2
14	Sedative-hypnotic-anxiolytic drugs. Anticonvulsants	2
15	Antipsychotics. Drugs used in Parkinson's disease and movement disorders	2
16	Antidepressants. CNS stimulants	2
17	Endocrine drugs	2
18	Anti-inflammatory drugs. Drugs acting on immune system	2
19	Anticancer drugs	2
20	Final Module 1 control "Medical prescriptions. General pharmacology. Pharmacology of drugs affecting the nervous system and metabolism"	2
21	Drugs for disorders of the respiratory system	2
22	Cardiovascular drugs. Antiarrhythmics. Drugs for heart failure	2
23	Antianginal drugs. Antihyperlipidemic drugs	2
24	Antihypertensive drugs	2
25	Diuretics. Drugs for Gout	2
26	Drugs used in blood disorders	2
27	Drugs used in gastrointestinal dysfunction	2
28	Synthetic chemotherapeutic drugs	2
29	Antibiotics-I. Cell wall synthesis inhibitors. DNA synthesis inhibitors	2
30	Antibiotics-II. Protein synthesis inhibitors. Antitubercular drugs	2
31	Antifungal drugs. Antiviral drugs	2
32	Antiprotozoal drugs. Antihelminthic drugs	2
33	Poisoning and toxidromes. Pharmacology of antidotes	2
34	Final on-line testing	2
35	Final Module 2 control "Pharmacology of drugs affecting major organ systems. Pharmacology of antimicrobial drugs. Treatment of acute poisonings"	2
	Total	70

13. THEMATIC PLAN OF INDIVIDUAL WORK

Nº	Name of topic	Amount of hours
1	Drug metabolism	4
2	Adverse effects of drugs	4
3	Drug-drug interactions	4
4	Pharmacogenomics	4
5	Drug development & regulation	6
6	Treatment of glaucoma	2
7	Treatment of migraine	2
8	Drugs used in Alzheimer's disease	2
9	Drugs of abuse. Alcohols	4
10	Serotonin related agonists & antagonists	4
11	Prostaglandins. Eicosanoid agonists and antagonists	4
12	Drugs used in rheumatoid arthritis	2
13	Hypothalamic & pituitary hormones	4
14	Gonadal hormones & inhibitors	4
15	Reproductive pharmacology	4
16	Drugs for obesity	2
17	Strategies in cancer chemotherapy	4

18	Case studies & MCQs for Module 1	10
19	Drugs acting on uterus	2
20	Treatment of osteoporosis	2
21	Agents used in anemia and cytopenias. Hematopoietic growth factors	4
22	Nitric oxide donors & inhibitors	2
23	Immunosuppressive therapy	2
24	Immunomodulation therapy	2
25	Disinfectants, antiseptics, & sterilants	2
26	Rational clinical use of antimicrobials	4
27	Management of poisoned patient	4
28	Pharmacology of chelators	4
29	Environmental & occupational toxicology	4
30	Case studies & MCQs for Module 1	10
	Total	110

14. LIST OF INDIVIDUAL TASKS (*if provided*)

- Active membership in the student scientific society
- Participation in scientific conferences
- Publication of abstracts / articles in periodicals (journals, abstract books).
- Production of visual aids according to educational programs (tables, etc.).
- Writing essays, literature review

15. LIST OF THEORETICAL TASKS TO THE FINAL MODULE CONTROL

Module 1. MEDICAL PRESCRIPTIONS. GENERAL PHARMACOLOGY.

PHARMACOLOGY OF DRUGS AFFECTING THE NERVOUS SYSTEM AND METABOLISM.

Introduction: definition, historical perspective, branches and scope of the subject of pharmacology and its relation with other medical disciplines.

Nature and sources of drugs.

Drug nomenclature and dosage forms.

Routes of drugs' administration; advantages and disadvantages of different routes.

Concept of evidence-based medicine, essential medicines, and rational prescribing.

Development of new drugs: pre-clinical and clinical phases of drug evaluation.

Pharmacokinetic considerations: drug absorption, distribution, biotransformation and excretion.

Pharmacokinetic concepts of bioavailability, apparent volume of distribution (aVd), half-life ($t_{1/2}$), and clearance (CL).

Pharmacodynamics; site and mechanism of drug action, drug receptors and receptor regulation.

Concepts of agonists, antagonists, partial agonist and inverse agonist drugs.

Quantitative aspect of drug action: analysis of dose response curve and therapeutic index (safety index).

Factors affecting drug action and doses, how to prolong or shorten the drug action and effects.

Drug interactions and concept of pharmacogenomics/-genetics in drug action, effects and ADRs.

Adverse drug reactions (ADRs) and role of pharmacovigilance activity in ADR monitoring.

Drugs affecting afferent innervations. Pharmacology of Local anaesthetics.

Introduction to pharmacology of ANS. Pharmacology of Cholinergic drugs: cholinergic agonist and cholinesterase inhibiting drugs.

Pharmacology of Cholinergic blockers: muscarinic blockers, neuromuscular blockers, ganglionic blockers.

Pharmacology of Adrenergic drugs: adrenoceptor agonist and sympathomimetic drugs

Pharmacology of Adrenergic blockers.

Pharmacology of General anaesthetics and preanesthetic medications.

Topic 13. Pharmacology of analgesia

Pharmacology of Opioid analgesic and antagonists

Introduction and basic concepts of drugs affecting CNS activity: Neurotransmitters and their pathways and important sites of Central Nervous System effect of drugs.

Pharmacology of Sedative-hypnotic drugs. Antianxiety drugs.

Pharmacology of Antiepileptic drugs.

Pharmacology of Antipsychotic/Neuroleptic drugs.

Pharmacology of Antiparkinsonian drugs and drugs for other neurodegenerative and movement disorders

Pharmacology of Antidepressant and antimania drugs. Pharmacology of ethyl alcohol and other alcohols.

Pharmacology of CNS stimulants, psychomimetic drugs, drug dependence and substance abuse

Pharmacology of pituitary and hypothalamic hormones.

Pharmacology of Thyroid hormones and antithyroid drugs.

Drugs for diabetes mellitus: Insulin and oral antidiabetic agents.

Pharmacology of Adrenocorticosteroids.

Pharmacology of Estrogens, progesterone and inhibitors. Oral contraceptives & HRT

Pharmacology of Anti-inflammatory drugs. Pharmacology of drugs acting on immune system.

Prostaglandins & Leukotrienes, Histamine & H1 blockers, 5-HT agonists & antagonists. NSAIDs.

Drug treatment of rheumatoid arthritis & other autoimmune diseases. Antihistamines.

Pharmacology of Immunosuppressants and immunomodulators.

Basic principles of cancer chemotherapy. Pharmacology of anticancer drugs. Problems associated with chemotherapy.

Module 2. PHARMACOLOGY OF DRUGS AFFECTING MAJOR ORGAN SYSTEMS. PHARMACOLOGY OF ANTIMICROBIAL DRUGS.

TREATMENT OF ACUTE POISONINGS

Pharmacology of Antitussives, expectorants, mucolytics.

Drug treatment of bronchial asthma, COPD.

Pharmacology of Antiarrhythmics.

Pharmacology of Digitalis & drug therapy of CHF.

Pharmacology of Antianginal Drugs – Nitrates, Beta-blockers, Calcium Channel Blockers and Potassium Channel Openers. Treatment of Angina.

Drug therapy of Myocardial Infarction & Peripheral Vascular Diseases.

Pharmacology of Antihyperlipidemic Drugs.

General considerations and classification of Antihypertensives.

Pharmacology of Central sympatholytics, Ganglionic blockers, Alpha & Beta adrenoceptor blockers, Vasodilators, ACE inhibitors & Angiotensin AT2 receptor antagonists

Drug therapy of Hypertension.

Pharmacology of Diuretics, Thiazide diuretics, Loop diuretics, Carbonic anhydrase inhibitors & Osmotic diuretics, Potassium sparing diuretics.

Complications of diuretic therapy & use of diuretics in non-edematous disorders.

Drugs used in blood disorders

Antithrombotic drugs. Pharmacology of Coagulants & Anticoagulants, Fibrinolytics & Antifibrinolytics, Antiplatelet drugs.

Treatment of Iron deficiency anemia, Treatment of Megaloblastic anemias. Plasma expanders.

Pharmacology of Drugs for gastric acidity, peptic ulcer & GERD.

Pharmacology of Antiemetic and prokinetic agents.

Drugs for constipation and Inflammatory Bowel Disease.

Pharmacology of Antidiarrheal agents.

Introduction and basic principles of chemotherapy of infection, infestation and neoplastic diseases and concepts of resistance to chemotherapeutic agents. Pharmacology of Sulfonamides & Cotrimoxazole.

Pharmacology of Quinolones.

Principles of antimicrobial therapy. Pharmacology of β -Lactam antibiotics, Penicillins & Cephalosporins

Pharmacology of Tetracyclines, Chloramphenicol, Aminoglycoside antibiotics, Macrolides. Chemotherapy of Urinary Tract Infections, Chemotherapy of Sexually transmitted Diseases, Chemotherapy of tuberculosis.

Pharmacology of Antifungal drugs.

Pharmacology of Antiviral drugs.

Pharmacology of Antimalarial drugs & Chemotherapy of malaria.

Pharmacology of Antiamoebic drugs & Chemotherapy of amoebiasis & Other Protozoal diseases.

Pharmacology of Anthelmintics.

Clinical Toxicology. Management of the poisoned patient.

Common Toxidromes. Pharmacology of Antidotes.

16. LIST OF PRACTICAL SKILLS AND TASKS TO THE FINAL MODULE CONTROL

Give pharmacological characteristic of the listed drugs and write prescription

Module 1. MEDICAL PRESCRIPTIONS. GENERAL PHARMACOLOGY.

PHARMACOLOGY OF DRUGS AFFECTING THE NERVOUS SYSTEM AND METABOLISM.

- | | |
|-------------------------------|-------------------------------------|
| - Lidocaine | - Zolpidem |
| - Pilocarpine | - Natrium valproate (Valproic acid) |
| - Proserine (Neostigmine) | - Carbamazepine |
| - Galantamine | - Lamotrigine |
| - Atropine | - Levodopa |
| - Dithyline (Succinylcholine) | - Aminazine (Chlorpromazine) |
| - Adrenaline (Epinephrine) | - Droperidol |
| - Noradrenaline | - Amitriptyline |
| - Dobutamine | - Fluoxetine |
| - Isadrine (Isoproterenol) | - Morphine |
| - Mesatone (Phenylephrine) | - Promedol (Trimeperidine) |
| - Salbutamol | - Fentanyl |
| - Fenoterol | - Tramadol |
| - Anaprilin (Propranolol) | - Naloxone |
| - Metoprolol | - Acetylsalicylic acid (Aspirin) |
| - Ketamine | - Ibuprofen |
| - Diazepam | - Diclofenac |
| - Nitrazepam | - Celecoxib |
| - Phenobarbital | - Paracetamol (Acetaminophen) |

Module 2. PHARMACOLOGY OF DRUGS AFFECTING MAJOR ORGAN SYSTEMS.

PHARMACOLOGY OF ANTIMICROBIAL DRUGS.

TREATMENT OF ACUTE POISONINGS

- | | |
|----------------------------|------------------|
| - Codeine | - Cromolyn |
| - Dextromethorphan | - Almagel |
| - Glaucine | - Famotidine |
| - Ambroxol | - Omeprazole |
| - Acetylcysteine | - Ondansetron |
| - Salbutamol | - Metoclopramide |
| - Theophylline | - Bisacodyl |
| - Ipratropium (Tiotropium) | - Loperamide |
| - Beclomethasone | - Pancreatin |

- Contrycal
- Drotaverine (No-spa)
- Oxytocin
- Digoxin
- Corglycon
- Strophantin
- Dobutamine
- Panangin
- Nitroglycerine
- Metoprolol
- Atenolol
- Verapamil
- Amiodarone
- Lisinopril
- Enalapril
- Losartan
- Amlodipine
- Clonidine
- Magnesium sulfate
- Atorvastatin
- Lovastatin
- Fenofibrate
- Hydrochlorothiazide
- Furosemide
- Spironolactone
- Mannitol (Mannit)
- Allopurinol
- Aspirin
- Heparin
- Protamine sulfate
- Warfarin
- Streptokinase
- Alteplase
- Clopidogrel
- Aminocaproic acid
- Vicasol (Vitamin K)
- Iron (Fercoven, Maltofer)
- Cyanocobalamin
- L-thyroxine
- Mercazolil (Methimazole)
- Propylthiouracil
- Insulin
- Glibenclamide
- Metformin
- Prednisolone
- Dexamethasone
- Hydrocortisone
- Dimedrol (Diphenhydramine)
- Loratadine
- Ketotifen
- Methotrexate
- Cisplatin
- Unithiol (Dimercaprol)
- Activated charcoal
- Biseptol (Co-trimoxazole)
- Sulfasalazine
- Benzylpenicillin (Penicillin G)
- Amoxicillin
- Amoxiclav
- Cefazoline
- Ceftriaxone
- Vancomycin
- Azithromycin
- Clarithromycin
- Doxycycline
- Gentamycin
- Streptomycin
- Lincomycin
- Laevomycesin (Chloramphenicol)
- Ciprofloxacin
- Levofloxacin
- Imipenem
- Clindamycin
- Amphotericin B
- Fluconazole
- Terbinafine
- Isoniazid
- Rifampin
- Ethambutol
- Acyclovir
- Oseltamivir (Tamiflu)
- Zidovudine
- Chingamin (Chloroquine)
- Primaquine
- Metronidazole
- Mebendazole
- Albendazole

17. METHODS AND FORMS OF ASSESSMENT

During the study of the discipline, all types of student activities are subject to control, both current (at each lesson) and final (during control activities).

Modular control is a diagnosis of the student's assimilation of the module material (credit). The semester ends with a final module control.

The initial control of students' knowledge is carried out during practical classes and includes testing knowledge of theoretical and practical material studied in previous courses, conducted by frontal oral examination, or writing tests, which uses questions for tests.

Current control of students' knowledge is carried out during practical classes and includes testing of knowledge of theoretical material and control of mastering practical skills, which are provided by methodical development of classes on relevant topics. Testing of students' knowledge is carried out with the help of oral face-to-face interviews, solving test problems of varying severity, solving typical and atypical situational problems, as well as during checking the correctness of laboratory research tasks.

Intermediate control of students' knowledge is carried out during the final tests during the last lesson of the content module.

Final control of students' knowledge is carried out at the last practical lesson after completion of the module in the form of final modular control. Students find out the knowledge of theoretical material (according to the list of questions). In addition, students perform practical work that is attached to the ticket and solve situational problems, which is also taken into account when assessing their knowledge.

The final module control (PMC) is carried out after the completion of the study of all topics of the module at the last control session of the module.

Students who have attended all the classes provided by the curriculum in the discipline and received positive grades ("5", "4", "3"), as well as scored the number of points during the study of the module, not less than minimal.

A student who, for valid or non-valid reasons, has missed classes is allowed to work off academic arrears until a certain deadline.

The maximum number of points that a student can score during the final module control is 80.

Module control is conducted orally and in writing and include theory questions, case studies, MCQs, and prescribing drugs.

The final module control is considered credited if the student has scored at least 50 points.

Thus, the shares of the results of the assessment of current educational activities and the final module control are 60% and 40%, respectively.

18. EVALUATION OF THE LEVEL OF STUDENT TRAINING IN THE DISCIPLINE

Procedure, methods and criteria for assessing the current educational activities, methods and criteria for assessing during the final module control, assessment of the discipline as a whole).

Distribution of points assigned to students (with notes: - on the maximum and minimum number of points for studying the module, - on the conversion of points into traditional grades "5", "4", "3", "2" when mastering the topic of the module; - on the minimum number of points for admission to the final modular control (FMC); - the minimum number of points for the module control).

Number of module number of study hours / number of credits ECTS	Number of content modules, their numbers	Number of practical classes	Conversion into point of the traditional scale				Scores for individual task	Minimum score *
			Traditional scale					
			"5"	"4"	"3"	"2"		
Module 1 104/3.5	5 (№№ 1-5)	18	6	5	4	0	12	72
Module 2 106/3.5	3 (№№ 6-8)	14	8	7	5	0	8	70

The maximum number of points that a student can score for the practical activity during the study of the module is calculated by multiplication the number of points corresponding to the grade "5" by the number of topics in the module (excluding the last topic – final module control), and adding scores for the individual task, with overall score not higher than 120 points.

The minimum number of points that a student must score during study of the module to be permitted to final module control is calculated by multiplication the number of points corresponding to the mark “3” by the number of topics in the module, with overall score not less than 70 points. The minimum number of points for module 1 is 72 points, for module 2 - 70 points.

19. RECOMMENDED LITERATURE

19.1 Basic

1. Basic & Clinical Pharmacology - Katzung BG (Ed), International Edition Lange Medical Books/ McGraw–Hill Medical Publishing Division, New York.
2. Essentials of Medical Pharmacology - Tripathi KD (Ed), Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
3. Lippincott Illustrated Reviews: Pharmacology - Karen Whalen (Ed), Wolters Kluwer, Philadelphia.

19.2. Additional

1. Katzung & Trevor’s Pharmacology Examination & Board Review - Anthony J. Trevor, Bertram G. Katzung, Marieke Kruidering-Hall. McGraw-Hill Education, New York.
2. STEP 1 Lecture Notes: Pharmacology, Kaplan Medical, New York.

19.3 Information resources

1. <http://moodle.bsmu.edu.ua/course/category.php?id=1168>
2. <https://www.drugs.com/>

20. COMPILERS OF THE STUDENT HANDBOOK (SYLLABUS)

Shchudrova Tetiana – Associate professor, PhD