

**The Ministry of Health of Ukraine**  
**Bogomolets National Medical University**

**METHODICAL RECOMMENDATIONS**  
**to practical classes**  
**Modul 1**

Academic discipline	Pharmacology
Field of knowledge	22 “Health care”
Specialty	226 “Pharmacy. Industrial pharmacy”
Specialization	226.01 “Pharmacy”
Form of education	Full-time study
Department	Pharmacology

Approved at the Department of Pharmacology meeting  
on August 26, 2024, protocol № 1

Head of the Department



prof. G.V. Zaychenko

Reviewed and approved by the CMC of specialty 226 “Pharmacy, Industrial  
Pharmacy” meeting on August 30, 2024, protocol № 1

2024-2025 a. y.

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**Topic 1. Stages of medicines elaboration and development. Drug life circle. Regulatory and legal aspects of medicines turnover in Ukraine. Basics of prescription. Dispensing of medicines by electronic prescription.**

**Competencies:**

***Integral Competence:***

- Ability to solve problems of a research and/or innovative nature in the field of pharmacy.

***General competences (GC):***

- GC02. Knowledge and understanding of the subject area; understanding of professional activity.
- GC 03. Ability to communicate in the state language both orally and in writing.
- GC 04. Ability to communicate in a foreign language.
- GC 06. Ability to work in a team.
- GC 09. Ability to use information and communication technologies.
- GC 10. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty.

***Special (professional, subject) competences (PC):***

- PC01. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts.
- PC 02. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy.
- PC 03. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.
- PC 04. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying.
- PC 06. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient.
- PC 08. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics

**Purpose:** Acquisition of theoretical knowledge and practical skills by higher education students regarding the stages of drug development and implementation, the

lifecycle of pharmaceuticals, regulatory and legal aspects of drug circulation in Ukraine, medical prescriptions, the variety of dosage forms, and dispensing medications via electronic prescriptions. This will prepare students for practical activities and enable them to perform their functional duties effectively, related to the rational selection of pharmaceutical forms of drugs.

**Equipment:** safety instructions, interactive multimedia system (if needed), collection of pharmaceuticals, reference books.

### Lesson Plan and Organizational Structure

Stage Name	Stage Description	Levels of Mastery	Time
<b>Preparatory</b>	Organizational matters (checking student attendance)	Familiarization	10 min.
	Review of tasks assigned for independent preparation	Perception	20 min.
	Control and assessment of students' entry-level knowledge in pharmacology	Reproductive	20 min.
<b>Main</b>	Development of professional skills (students identifying drug groups, mechanisms of action, main pharmacological effects, indications for use, possible side effects).	Comprehension Understanding	90 min.
	Practicing professional competence: solving and evaluating situational tasks	Practical application Exploratory creative activity	45 min.
	Knowledge consolidation	Reinforcement	5 min.
<b>Final</b>	Test control of final preparation level	Reproduction	20 min.
	Overall assessment of student learning activity	Familiarization	10 min.
	Informing students about the next lesson's topic and independent work assignments	Familiarization	5 min.

### Recommended Literature

#### Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 1-5, 106-116, 750-755.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina;

Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updat. - Vinnytsia : Nova Knyha, 2018. – P. 9-10.

3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 1-19; 1146-1155.

### **Secondary:**

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

### **Information Resources:**

1. Electronic Library Catalog (select guest login): [http://ek.librarynmu.com/cgi-bin/irbis64r\\_plus/cgiirbis\\_64\\_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU\\_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5](http://ek.librarynmu.com/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5)
2. Repository: <http://ir.librarynmu.com/>
3. LIKAR\_NMU Page: <https://likar.nmu.kiev.ua/md/course/view.php?id=1189>

### **Questions for student self-preparation for the practical lesson:**

1. Stages of medicines elaboration and development, drug life cycle. Definitions: active pharmaceutical ingredient, drug, original (innovative) drug, reference, generic, interchangeable, homeopathic, hybrid, orphan, similar biological drug, high-tech (biotechnological) drugs.
2. International Nonproprietary Name (INN). Anatomical Therapeutic Chemical (ATC) classification of drugs.
3. State regulatory documents: State Pharmacopoeia and State Drug Formulary, their content and purpose. State Expert Center of the Ministry of Health of Ukraine. State Drug Formulary. Pharmacovigilance.
4. Basics of prescription. The prescription as a medical, legal, and financial document. Rules for prescribing for outpatients and the procedure for dispensing drugs based on them. Forms of prescription blanks, their purpose. Electronic prescription.
5. Government program "Affordable Medicines." Reimbursement. Pharmacist protocols.
6. Classification of dosage forms. Official and magistral prescriptions.
7. General characteristics and classification of solid dosage forms: simple and complex divided (dosed) and undivided (undosed) powders, tablets, capsules (spansules, pearls, cachets), dragees, glossets, lozenges, caramels, granules.
8. Characteristics, types, and purposes of suppositories. Substances used as bases for their preparation.
9. General characteristics of soft dosage forms – ointments and pastes, their differences.
10. Characteristics, types and purpose of therapeutic systems
11. General characteristics of solutions dosage form. Solutions for external and internal use, eye drops, forms of drug release for injections, mixtures, infusions, decoctions, syrup, emulsion, suspension.

12. Characteristics, types, and purposes of dosage forms for inhalations.
13. Instructions for the medical use of drugs: structure, meaning for the doctor, pharmacist, and patient.
14. Modern sources of information about medicinal products.

**Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.**

## **Topic 2. General pharmacology. Pharmacodynamics and pharmacokinetics of medicines. The main mechanisms of medicines action**

### **Competencies:**

#### ***Integral Competence:***

- Ability to solve problems of a research and/or innovative nature in the field of pharmacy.

#### ***General competences (GC):***

- GC02. Knowledge and understanding of the subject area; understanding of professional activity.
- GC 03. Ability to communicate in the state language both orally and in writing.
- GC 04. Ability to communicate in a foreign language.
- GC 06. Ability to work in a team.
- GC 09. Ability to use information and communication technologies.
- GC 10. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty.

#### ***Special (professional, subject) competences (PC):***

- PC01. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts.
- PC 02. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy.
- PC 03. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.
- PC 04. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying.
- PC 06. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient.
- PC 08. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics

**Purpose:** acquisition of theoretical knowledge and practical skills by higher education students regarding the basic characteristics of drugs – pharmacokinetics and pharmacodynamics, main mechanisms of drug action.

**Equipment:** safety instructions, interactive multimedia system (if needed), collection of pharmaceuticals, reference books.

### **Lesson Plan and Organizational Structure**

Stage Name	Stage Description	Levels of Mastery	Time
<b>Preparatory</b>	Organizational matters (checking student attendance)	Familiarization	10 min.
	Review of tasks assigned for independent preparation	Perception	20 min.
	Control and assessment of students' entry-level knowledge in pharmacology	Reproductive	20 min.
<b>Main</b>	Development of professional skills (students identifying drug groups, mechanisms of action, main pharmacological effects, indications for use, possible side effects).	Comprehension Understanding	90 min.
	Practicing professional competence: solving and evaluating situational tasks	Practical application Exploratory creative activity	45 min.
	Knowledge consolidation	Reinforcement	5 min.
<b>Final</b>	Test control of final preparation level	Reproduction	20 min.
	Overall assessment of student learning activity	Familiarization	10 min.
	Informing students about the next lesson's topic and independent work assignments	Familiarization	5 min.

### **Recommended Literature**

#### **Basic:**

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 6-68, 117-132, 133-142, 143-151.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updatet. - Vinnytsia : Nova Knyha, 2018. – P. 10-27.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 20-88.

#### **Secondary:**

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.



### Information Resources:

1. Electronic Library Catalog (select guest login):  
[http://ek.librarynmu.com/cgi-bin/irbis64r\\_plus/cgiirbis\\_64\\_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU\\_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5](http://ek.librarynmu.com/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5)
2. Repository:  
<http://ir.librarynmu.com/>
3. LIKAR\_NMU Page: <https://likar.nmu.kiev.ua/md/course/view.php?id=1189>

### Questions for student self-preparation for the practical lesson:

1. Concept of pharmacokinetics, LADME model.
2. Routes of medicines administration and their significance for the speed, strength, and nature of drug action.
3. Mechanisms of medicines transport across biological membranes.
4. Distribution of medicines in biological fluids, organs, and tissues.
5. Biotransformation of medicines.
6. Medicines elimination (excretion, elimination).
7. Significance of pharmacokinetics for clinical practice.
8. Pharmacodynamics of medicines (mechanism of action, pharmacological effect).
9. The concept of receptors. The main types of protein receptors of drugs. Transmembrane ion channels: ligand-dependent, voltage-dependent, regulated by secondary messengers. Transmembrane G-protein-coupled receptors (including cannabinoid receptors) with enzymatic cytoplasmic domains – receptor tyrosine kinases, tyrosine phosphatases, serine/threonine kinases, guanylate cyclases, tyrosine kinase-associated receptors. Intracellular receptors, receptors – enzymes, receptors – membrane transporters.
10. Types of medicines action (pre-absorptive or local, reflex, absorptive, selective, main and side effects, direct and indirect, reversible and irreversible). Types of pharmacotherapy.
11. Concept of doses (single, daily, course doses), average therapeutic, average lethal; drug safety indicators: therapeutic range and therapeutic index.
12. Factors affecting the pharmacological effect of drugs in the body.
13. Phenomena occurring with repeated drug administration: cumulation, tachyphylaxis, habituation, tolerance. Types of drug dependence.
14. Combined medicines actions: synergism and antagonism (types, causes, and significance for practice).
15. Features of pharmacokinetics and pharmacodynamics depending on age.

**Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.**

### **Topic 3. General pharmacology. Pharmacovigilance in Ukraine. Modern sources of information about medicines. Control of practical skills regarding the ability to use modern directories of medicines**

#### **Competencies:**

##### ***Integral Competence:***

- Ability to solve problems of a research and/or innovative nature in the field of pharmacy.

##### ***General competences (GC):***

- GC02. Knowledge and understanding of the subject area; understanding of professional activity.
- GC 03. Ability to communicate in the state language both orally and in writing.
- GC 04. Ability to communicate in a foreign language.
- GC 06. Ability to work in a team.
- GC 09. Ability to use information and communication technologies.
- GC 10. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty.

##### ***Special (professional, subject) competences (PC):***

- PC01. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts.
- PC 02. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy.
- PC 03. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.
- PC 04. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying.
- PC 06. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient.
- PC 08. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics

**Purpose:** Acquisition of theoretical knowledge and practical skills by higher education students in pharmacovigilance in Ukraine, adverse drug reactions, and contraindications for drug prescriptions; modern sources of information on medicinal products.

**Equipment:** safety instructions, interactive multimedia system (if needed), collection of pharmaceuticals, reference books.

### **Lesson Plan and Organizational Structure**

Stage Name	Stage Description	Levels of Mastery	Time
<b>Preparatory</b>	Organizational matters (checking student attendance)	Familiarization	10 min.
	Review of tasks assigned for independent preparation	Perception	20 min.
	Control and assessment of students' entry-level knowledge in pharmacology	Reproductive	20 min.
<b>Main</b>	Development of professional skills (students identifying drug groups, mechanisms of action, main pharmacological effects, indications for use, possible side effects).	Comprehension Understanding	90 min.
	Practicing professional competence: solving and evaluating situational tasks	Practical application Exploratory creative activity	45 min.
	Knowledge consolidation	Reinforcement	5 min.
<b>Final</b>	Test control of final preparation level	Reproduction	20 min.
	Overall assessment of student learning activity	Familiarization	10 min.
	Informing students about the next lesson's topic and independent work assignments	Familiarization	5 min.

### **Recommended Literature**

#### **Basic:**

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 152-162, 733-743.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 24-25.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 56-88; 1156-1174.

**Secondary:**

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

**Information Resources:**

1. Electronic Library Catalog (select guest login):  
[http://ek.librarynmu.com/cgi-bin/irbis64r\\_plus/cgiirbis\\_64\\_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU\\_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5](http://ek.librarynmu.com/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5)
2. Repository:  
<http://ir.librarynmu.com/>
3. LIKAR\_NMU Page: <https://likar.nmu.kiev.ua/md/course/view.php?id=1189>

**Questions for student self-preparation for the practical lesson:**

1. Classification and mechanisms of adverse drug reactions.
2. Concept of Pharmacovigilance. History of the development of approaches to drug safety assessment.
3. Hierarchy of the pharmacovigilance department.
4. Sources and methods of obtaining information on adverse drug reactions in Ukraine.
5. Principles of risk/benefit assessment.

**Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.**

#### **Topic 4. Medicines affecting the transmission of excitation in adrenergic synapses.**

##### **Competencies:**

##### ***Integral Competence:***

- Ability to solve problems of a research and/or innovative nature in the field of pharmacy.

##### ***General competences (GC):***

- GC02. Knowledge and understanding of the subject area; understanding of professional activity.
- GC 03. Ability to communicate in the state language both orally and in writing.
- GC 04. Ability to communicate in a foreign language.
- GC 06. Ability to work in a team.
- GC 09. Ability to use information and communication technologies.
- GC 10. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty.

##### ***Special (professional, subject) competences (PC):***

- PC01. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts.
- PC 02. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy.
- PC 03. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.
- PC 04. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying.
- PC 06. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient.
- PC 08. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics

**Purpose:** Acquisition by higher education students of theoretical knowledge and practical skills regarding drugs that affect excitation transmission in adrenergic synapses.

**Equipment:** safety instructions, interactive multimedia system (if needed), collection of pharmaceuticals, reference books.

### Lesson Plan and Organizational Structure

Stage Name	Stage Description	Levels of Mastery	Time
<b>Preparatory</b>	Organizational matters (checking student attendance)	Familiarization	10 min.
	Review of tasks assigned for independent preparation	Perception	20 min.
	Control and assessment of students' entry-level knowledge in pharmacology	Reproductive	20 min.
<b>Main</b>	Development of professional skills (students identifying drug groups, mechanisms of action, main pharmacological effects, indications for use, possible side effects).	Comprehension Understanding	90 min.
	Practicing professional competence: solving and evaluating situational tasks	Practical application Exploratory creative activity	45 min.
	Knowledge consolidation	Reinforcement	5 min.
<b>Final</b>	Test control of final preparation level	Reproduction	20 min.
	Overall assessment of student learning activity	Familiarization	10 min.
	Informing students about the next lesson's topic and independent work assignments	Familiarization	5 min.

### Recommended Literature

#### Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 163-174, 197-216.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 66-76.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 137-172.

#### Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

### Information Resources:

1. Electronic Library Catalog (select guest login):  
[http://ek.librarynmu.com/cgi-bin/irbis64r\\_plus/cgiirbis\\_64\\_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU\\_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5](http://ek.librarynmu.com/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5)
2. Repository:  
<http://ir.librarynmu.com/>
3. LIKAR\_NMU Page: <https://likar.nmu.kiev.ua/md/course/view.php?id=1189>

**Questions for student self-preparation for the practical lesson:**

1. General characteristics of drugs that affect excitation transmission in adrenergic synapses.
2. Pharmacological classification of drugs that affect excitation transmission in adrenergic synapses.
3. Pharmacological characteristics of  $\alpha,\beta$ -adrenergic agonists (mechanism of action, indications for use, side effects, contraindications).
4. Pharmacological characteristics of  $\alpha$ -adrenergic agonists (mechanism of action, indications for use, side effects, contraindications, typical signs of overdose, and measures for poisoning with drugs of this group).
5. Pharmacological characteristics of  $\beta$ -adrenergic agonists (mechanism of action, indications for use, side effects, contraindications, typical signs of overdose, and measures for poisoning with drugs of this group).
6. Pharmacological characteristics of sympathomimetics (mechanism of action, indications for use, side effects, contraindications, typical signs of overdose, and measures for poisoning with drugs of this group).
7. Pharmacological characteristics of  $\alpha,\beta$ -adrenergic blockers (mechanism of action, indications for use, side effects, contraindications).
8. Pharmacological characteristics of  $\alpha$ -adrenergic blockers (mechanism of action, indications for use, side effects, contraindications, typical signs of overdose, and measures for poisoning with drugs of this group).
9. Pharmacological characteristics of  $\beta$ -adrenergic blockers (mechanism of action, indications for use, side effects, contraindications, typical signs of overdose, and measures for poisoning with drugs of this group).
10. Pharmacological characteristics of sympatholytics (mechanism of action, indications for use, side effects, contraindications, typical signs of overdose, and measures for poisoning with drugs of this group).
11. Pharmacological characteristics of individual adrenergic drugs.
12. Pharmacological characteristics of drugs included in the "KROK-1. Pharmacy" exam: epinephrine hydrochloride (adrenaline hydrochloride), phenylephrine, dobutamine, salbutamol, propranolol, metoprolol, reserpine, clonidine (clonidine).

**Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.**

## **Topic 5. Medicines affecting the transmission of excitation in cholinergic synapses.**

### **Competencies:**

#### ***Integral Competence:***

- Ability to solve problems of a research and/or innovative nature in the field of pharmacy.

#### ***General competences (GC):***

- GC02. Knowledge and understanding of the subject area; understanding of professional activity.
- GC 03. Ability to communicate in the state language both orally and in writing.
- GC 04. Ability to communicate in a foreign language.
- GC 06. Ability to work in a team.
- GC 09. Ability to use information and communication technologies.
- GC 10. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty.

#### ***Special (professional, subject) competences (PC):***

- PC01. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts.
- PC 02. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy.
- PC 03. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.
- PC 04. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying.
- PC 06. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient.
- PC 08. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics

**Purpose:** Acquisition of theoretical knowledge and practical skills by higher education students regarding drugs that affect the transmission of excitation in cholinergic synapses.



**Equipment:** safety instructions, interactive multimedia system (if needed), collection of pharmaceuticals, reference books.

### Lesson Plan and Organizational Structure

Stage Name	Stage Description	Levels of Mastery	Time
<b>Preparatory</b>	Organizational matters (checking student attendance)	Familiarization	10 min.
	Review of tasks assigned for independent preparation	Perception	20 min.
	Control and assessment of students' entry-level knowledge in pharmacology	Reproductive	20 min.
<b>Main</b>	Development of professional skills (students identifying drug groups, mechanisms of action, main pharmacological effects, indications for use, possible side effects).	Comprehension Understanding	90 min.
	Practicing professional competence: solving and evaluating situational tasks	Practical application Exploratory creative activity	45 min.
	Knowledge consolidation	Reinforcement	5 min.
<b>Final</b>	Test control of final preparation level	Reproduction	20 min.
	Overall assessment of student learning activity	Familiarization	10 min.
	Informing students about the next lesson's topic and independent work assignments	Familiarization	5 min.

### Recommended Literature

#### Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 163-174, 175-196.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updat. - Vinnytsia : Nova Knyha, 2018. – P. 42-65.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 107-136.

#### Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

### Information Resources:

1. Electronic Library Catalog (select guest login):  
[http://ek.librarynmu.com/cgi-bin/irbis64r\\_plus/cgiirbis\\_64\\_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU\\_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5](http://ek.librarynmu.com/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5)
2. Repository:  
<http://ir.librarynmu.com/>
3. LIKAR\_NMU Page:  
<https://likar.nmu.kiev.ua/md/course/view.php?id=1189>

### Questions for student self-preparation for the practical lesson:

1. General characteristics of drugs that affect excitation transmission in cholinergic synapses.
2. Pharmacological classification of drugs that affect excitation transmission in cholinergic synapses.
3. Pharmacological characteristics of M, N-cholinomimetic drugs (mechanism of action, indications for use, side effects, contraindications).
4. Pharmacological characteristics of anticholinesterase drugs (mechanism of action, indications for use, side effects, contraindications, typical signs of overdose, and measures for poisoning with drugs of this group).
5. Pharmacological characteristics of M-cholinomimetic drugs (mechanism of action, indications for use, side effects, contraindications, typical signs of overdose, and measures for poisoning with drugs of this group).
6. Pharmacological characteristics of N-cholinomimetic drugs (mechanism of action, indications for use, side effects, contraindications, typical signs of overdose, and measures for poisoning with drugs of this group).
7. Pharmacological characteristics of central M-cholinoblockers (mechanism of action, indications for use, side effects, contraindications).
8. Pharmacological characteristics of M-cholinoblockers (mechanism of action, indications for use, side effects, contraindications, typical signs of overdose, and measures for poisoning with drugs of this group).
9. Pharmacological characteristics of drugs that inhibit acetylcholine release from presynaptic endings (mechanism of action, indications for use, side effects, contraindications, typical signs of overdose, and measures for poisoning with drugs of this group).
10. Pharmacological characteristics of muscle relaxants (mechanism of action, indications for use, side effects, contraindications, typical signs of overdose, and measures for poisoning with drugs of this group).
11. Pharmacological characteristics of ganglionic blockers (mechanism of action, indications for use, side effects, contraindications, typical signs of overdose, and measures for poisoning with drugs of this group).
12. Pharmacological characteristics of drugs included in the "KROK-1. Pharmacy" exam: neostigmine methylsulfate (Proserin), pilocarpine hydrochloride, atropine sulfate, pirenzepine, succinylcholine (Dithilin).

**Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.**

## **Topic 6. Medicines affecting afferent innervation. Medicines for general and local anesthesia.**

### **Competencies:**

#### ***Integral Competence:***

- Ability to solve problems of a research and/or innovative nature in the field of pharmacy.

#### ***General competences (GC):***

- GC02. Knowledge and understanding of the subject area; understanding of professional activity.
- GC 03. Ability to communicate in the state language both orally and in writing.
- GC 04. Ability to communicate in a foreign language.
- GC 06. Ability to work in a team.
- GC 09. Ability to use information and communication technologies.
- GC 10. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty.

#### ***Special (professional, subject) competences (PC):***

- PC01. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts.
- PC 02. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy.
- PC 03. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.
- PC 04. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying.
- PC 06. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient.
- PC 08. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics

**Purpose:** Acquisition by higher education students of theoretical knowledge and practical skills regarding drugs for general and local anesthesia, as well as drugs that affect afferent innervation.

**Equipment:** safety instructions, interactive multimedia system (if needed), collection of pharmaceuticals, reference books.

### Lesson Plan and Organizational Structure

Stage Name	Stage Description	Levels of Mastery	Time
<b>Preparatory</b>	Organizational matters (checking student attendance)	Familiarization	10 min.
	Review of tasks assigned for independent preparation	Perception	20 min.
	Control and assessment of students' entry-level knowledge in pharmacology	Reproductive	20 min.
<b>Main</b>	Development of professional skills (students identifying drug groups, mechanisms of action, main pharmacological effects, indications for use, possible side effects).	Comprehension Understanding	90 min.
	Practicing professional competence: solving and evaluating situational tasks	Practical application Exploratory creative activity	45 min.
	Knowledge consolidation	Reinforcement	5 min.
<b>Final</b>	Test control of final preparation level	Reproduction	20 min.
	Overall assessment of student learning activity	Familiarization	10 min.
	Informing students about the next lesson's topic and independent work assignments	Familiarization	5 min.

### Recommended Literature

#### Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 531-541, 563-568.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updat. - Vinnytsia : Nova Knyha, 2018. – P. 33-41; 90-99.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 440-473.

#### Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

### **Information Resources:**

1. Electronic Library Catalog (select guest login): [http://ek.librarynmu.com/cgi-bin/irbis64r\\_plus/cgiirbis\\_64\\_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU\\_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5](http://ek.librarynmu.com/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5)
2. Repository: <http://ir.librarynmu.com/>
3. LIKAR\_NMU Page: <https://likar.nmu.kiev.ua/md/course/view.php?id=1189>

### **Questions for student self-preparation for the practical lesson:**

1. General characteristics of analgesic drugs. Definition of general and local anesthesia, anesthesia, and their types. Types of anesthesia.
2. Requirements for general anesthetic agents. The sequence of action of anesthetic agents on different parts of the central nervous system.
3. ATC classification of drugs for general and local anesthesia. Classification of general anesthetic agents by: chemical structure, duration of action, and clinical application.
4. Pharmacological characteristics of general anesthetic drugs (mechanisms of action, classification, indications for use, side effects, contraindications).
5. Pharmacological characteristics of inhalational anesthetics (mechanisms of action, classification, indications for use, side effects, contraindications). Typical signs of overdose and measures for poisoning.
6. Pharmacological characteristics of non-inhalational anesthetics (mechanisms of action, classification, indications for use, side effects, contraindications).
7. Combined use of anesthetics with drugs from other pharmacological groups (cholinoblockers, tranquilizers, muscle relaxants). Concepts of premedication, induction, maintenance, and combined anesthesia.
8. Pharmacological characteristics of local anesthetics (mechanisms of action, classification, indications for use, side effects, contraindications). Requirements for anesthetic agents.
9. Application of drugs for different types of local anesthesia, typical signs of overdose, and measures for poisoning with these drugs, contraindications.
10. Classification of drugs that protect sensitive nerve endings from external irritants.
11. Pharmacological characteristics of representatives of each group of medicines that protect sensitive nerve endings from external irritants (astringents, adsorbents, demulcents). Indications for use of this group.
12. Classification of medicines that irritate sensitive nerve endings.
13. Pharmacological characteristics of medicines that irritate sensitive nerve endings: mechanism of action, indications. Specifics of application.
14. Pharmacological characteristics of medicines included in the "KROK-1. Pharmacy" exam: lidocaine.

**Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.**

## **Topic 7. Analgesics of opioid and non-opioid structure.**

### **Competencies:**

#### ***Integral Competence:***

- Ability to solve problems of a research and/or innovative nature in the field of pharmacy.

#### ***General competences (GC):***

- GC02. Knowledge and understanding of the subject area; understanding of professional activity.
- GC 03. Ability to communicate in the state language both orally and in writing.
- GC 04. Ability to communicate in a foreign language.
- GC 06. Ability to work in a team.
- GC 09. Ability to use information and communication technologies.
- GC 10. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty.

#### ***Special (professional, subject) competences (PC):***

- PC01. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts.
- PC 02. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy.
- PC 03. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.
- PC 04. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying.
- PC 06. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient.
- PC 08. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics

**Purpose:** Acquisition by higher education students of theoretical knowledge and practical skills regarding opioid and non-opioid analgesics.

**Equipment:** safety instructions, interactive multimedia system (if needed), collection of pharmaceuticals, reference books.

### Lesson Plan and Organizational Structure

Stage Name	Stage Description	Levels of Mastery	Time
<b>Preparatory</b>	Organizational matters (checking student attendance)	Familiarization	10 min.
	Review of tasks assigned for independent preparation	Perception	20 min.
	Control and assessment of students' entry-level knowledge in pharmacology	Reproductive	20 min.
<b>Main</b>	Development of professional skills (students identifying drug groups, mechanisms of action, main pharmacological effects, indications for use, possible side effects).	Comprehension Understanding	90 min.
	Practicing professional competence: solving and evaluating situational tasks	Practical application Exploratory creative activity	45 min.
	Knowledge consolidation	Reinforcement	5 min.
<b>Final</b>	Test control of final preparation level	Reproduction	20 min.
	Overall assessment of student learning activity	Familiarization	10 min.
	Informing students about the next lesson's topic and independent work assignments	Familiarization	5 min.

### Recommended Literature

#### Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 542-561.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updat. - Vinnytsia : Nova Knyha, 2018. – P. 130-159.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 553-574, 642-666.

#### Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

### **Information Resources:**

1. Electronic Library Catalog (select guest login): [http://ek.librarynmu.com/cgi-bin/irbis64r\\_plus/cgiirbis\\_64\\_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU\\_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5](http://ek.librarynmu.com/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5)
2. Repository: <http://ir.librarynmu.com/>
3. LIKAR\_NMU Page: <https://likar.nmu.kiev.ua/md/course/view.php?id=1189>

### **Questions for student self-preparation for the practical lesson:**

1. Principles of pharmacological management of pain syndromes of various origins.
2. General characteristics of opioid and non-opioid analgesics. Comparative characteristics of opioid and non-opioid analgesics.
3. ATC classification of analgesic agents.
4. Classification of opioid analgesics by origin, chemical structure, and effect on opioid receptors.
5. Pharmacological characteristics of opioid analgesics (mechanisms of action, indications for use, side effects, contraindications).
6. Pharmacological characteristics of individual opioid analgesics. Concept of neuroleptanalgesia.
7. Acute and chronic intoxication with opioid analgesics (morphinism), withdrawal symptoms. Principles of emergency treatment for opioid analgesic intoxication. Drug addiction as a socio-biological problem.
8. Classification of non-opioid analgesics by chemical structure and mechanism of action.
9. Pharmacological characteristics of non-opioid analgesics (mechanisms of action, indications for use, side effects, contraindications).
10. Pharmacological characteristics of representatives of non-opioid analgesics.
11. Typical complications of pharmacotherapy with non-opioid analgesics and measures for their prevention.
12. Principles of emergency treatment for acetaminophen (paracetamol) poisoning.
13. Pharmacological characteristics of drugs included in the "KROK-1. Pharmacy" exam: morphine hydrochloride, pethidine (promedol), fentanyl, naloxone, acetylsalicylic acid, acetaminophen (paracetamol).

**Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.**



## **Topic 8. Neuroleptics, tranquilizers, hypnotics, and sedative medicines.**

### **Competencies:**

#### ***Integral Competence:***

- Ability to solve problems of a research and/or innovative nature in the field of pharmacy.

#### ***General competences (GC):***

- GC02. Knowledge and understanding of the subject area; understanding of professional activity.
- GC 03. Ability to communicate in the state language both orally and in writing.
- GC 04. Ability to communicate in a foreign language.
- GC 06. Ability to work in a team.
- GC 09. Ability to use information and communication technologies.
- GC 10. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty.

#### ***Special (professional, subject) competences (PC):***

- PC01. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts.
- PC 02. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy.
- PC 03. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.
- PC 04. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying.
- PC 06. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient.
- PC 08. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics

**Purpose:** Acquisition by higher education students of theoretical knowledge and practical skills regarding psychotropic drugs with depressive effects – neuroleptics, tranquilizers, hypnotics, and sedatives.

**Equipment:** safety instructions, interactive multimedia system (if needed), collection of pharmaceuticals, reference books.

### Lesson Plan and Organizational Structure

Stage Name	Stage Description	Levels of Mastery	Time
<b>Preparatory</b>	Organizational matters (checking student attendance)	Familiarization	10 min.
	Review of tasks assigned for independent preparation	Perception	20 min.
	Control and assessment of students' entry-level knowledge in pharmacology	Reproductive	20 min.
<b>Main</b>	Development of professional skills (students identifying drug groups, mechanisms of action, main pharmacological effects, indications for use, possible side effects).	Comprehension Understanding	90 min.
	Practicing professional competence: solving and evaluating situational tasks	Practical application Exploratory creative activity	45 min.
	Knowledge consolidation	Reinforcement	5 min.
<b>Final</b>	Test control of final preparation level	Reproduction	20 min.
	Overall assessment of student learning activity	Familiarization	10 min.
	Informing students about the next lesson's topic and independent work assignments	Familiarization	5 min.

### Recommended Literature

#### Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 480-484, 569-578, 592-602.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 115-129.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 381-395, 511-531

#### Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

#### Information Resources:

1. Electronic Library Catalog (select guest login): [http://ek.librarynmu.com/cgi-bin/irbis64r\\_plus/cgiirbis\\_64\\_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU\\_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5](http://ek.librarynmu.com/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5)
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**Questions for student self-preparation for the practical lesson:**

1. General characteristics of psychotropic drugs: neuroleptics, tranquilizers, hypnotics, and sedatives.
2. Anatomical-Therapeutic-Chemical classification of psychotropic drugs with depressive effects (neuroleptics, tranquilizers, hypnotics, and sedatives).
3. Classification of psychotropic drugs with depressive effects (neuroleptics, tranquilizers, hypnotics, and sedatives).
4. Pharmacological characteristics of neuroleptics (mechanisms of action, pharmacological effects, indications for use, side effects). Typical signs of overdose and emergency measures for poisoning.
5. Pharmacological characteristics of tranquilizers (mechanisms of action, pharmacological effects, indications for use, side effects). Typical signs of overdose and emergency measures for poisoning.
6. Pharmacological characteristics of sedatives (mechanisms of action, pharmacological effects, indications for use, side effects). Typical signs of overdose and emergency measures for poisoning.
7. Pharmacological characteristics of hypnotics (mechanisms of action, pharmacological effects, indications for use, side effects).
8. Combined use with drugs from other pharmacological groups. Concepts of neuroleptanalgesia and ataractanalgesia.
9. Specifics of prescribing and handling psychotropic drugs.
10. Pharmacological characteristics of drugs included in the "KROK-1. Pharmacy" exam: chlorpromazine (aminazine), droperidol, diazepam, nitrazepam, phenobarbital, aminobarbital, sodium bromide.

**Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.**

## **Topic 9. Anticonvulsants. Medicines for the treatment of neurodegenerative diseases.**

### **Competencies:**

#### ***Integral Competence:***

- Ability to solve problems of a research and/or innovative nature in the field of pharmacy.

#### ***General competences (GC):***

- GC02. Knowledge and understanding of the subject area; understanding of professional activity.
- GC 03. Ability to communicate in the state language both orally and in writing.
- GC 04. Ability to communicate in a foreign language.
- GC 06. Ability to work in a team.
- GC 09. Ability to use information and communication technologies.
- GC 10. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty.

#### ***Special (professional, subject) competences (PC):***

- PC01. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts.
- PC 02. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy.
- PC 03. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.
- PC 04. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying.
- PC 06. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient.
- PC 08. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics

**Purpose:** Acquisition by higher education students of theoretical knowledge and practical skills regarding drugs for the treatment of epilepsy and neurodegenerative diseases.

**Equipment:** safety instructions, interactive multimedia system (if needed), collection of pharmaceuticals, reference books.

### **Lesson Plan and Organizational Structure**

Stage Name	Stage Description	Levels of Mastery	Time
<b>Preparatory</b>	Organizational matters (checking student attendance)	Familiarization	10 min.
	Review of tasks assigned for independent preparation	Perception	20 min.
	Control and assessment of students' entry-level knowledge in pharmacology	Reproductive	20 min.
<b>Main</b>	Development of professional skills (students identifying drug groups, mechanisms of action, main pharmacological effects, indications for use, possible side effects).	Comprehension Understanding	90 min.
	Practicing professional competence: solving and evaluating situational tasks	Practical application Exploratory creative activity	45 min.
	Knowledge consolidation	Reinforcement	5 min.
<b>Final</b>	Test control of final preparation level	Reproduction	20 min.
	Overall assessment of student learning activity	Familiarization	10 min.
	Informing students about the next lesson's topic and independent work assignments	Familiarization	5 min.

### **Recommended Literature**

#### **Basic:**

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 514-529, 580-591.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updatet. - Vinnytsia : Nova Knyha, 2018. – P. 100-114.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 409-439; 492-510.

**Secondary:**

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

**Information Resources:**

1. Electronic Library Catalog (select guest login): [http://ek.librarynmu.com/cgi-bin/irbis64r\\_plus/cgiirbis\\_64\\_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU\\_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5](http://ek.librarynmu.com/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5)
2. Repository: <http://ir.librarynmu.com/>
3. LIKAR\_NMU Page: <https://likar.nmu.kiev.ua/md/course/view.php?id=1189>

**Questions for student self-preparation for the practical lesson:**

1. General characteristics of anticonvulsants and drugs for the treatment of neurodegenerative diseases.
2. Anatomical-Therapeutic-Chemical and other classifications of antiepileptic, antiparkinsonian, and dementia treatment drugs.
3. Pharmacological characteristics of antiepileptic, antiparkinsonian, and neurodegenerative disease treatment drugs (mechanisms of action, pharmacological effects, indications for use, side effects).
4. Emergency treatment for epileptic status.
5. Specifics of prescribing and handling psychotropic drugs.
6. General characteristics of medicines based on cannabinoids for the treatment of epilepsy and neurodegenerative diseases.
7. Pharmacological characteristics of drugs included in the "KROK-1. Pharmacy" exam: sodium valproate, levodopa/carbidopa, phenobarbital.

**Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.**

## **Topic 10. Antidepressants, nootropic medicines, psychomotor stimulants and analeptics.**

### **Competencies:**

#### ***Integral Competence:***

- Ability to solve problems of a research and/or innovative nature in the field of pharmacy.

#### ***General competences (GC):***

- GC02. Knowledge and understanding of the subject area; understanding of professional activity.
- GC 03. Ability to communicate in the state language both orally and in writing.
- GC 04. Ability to communicate in a foreign language.
- GC 06. Ability to work in a team.
- GC 09. Ability to use information and communication technologies.
- GC 10. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty.

#### ***Special (professional, subject) competences (PC):***

- PC01. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts.
- PC 02. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy.
- PC 03. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.
- PC 04. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying.
- PC 06. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient.
- PC 08. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics

**Purpose:** Acquisition by higher education students of theoretical knowledge and practical skills regarding drugs for the treatment of depression, nootropic drugs, psychomotor stimulants, analeptics, and adaptogens.

**Equipment:** safety instructions, interactive multimedia system (if needed), collection of pharmaceuticals, reference books.

### **Lesson Plan and Organizational Structure**

Stage Name	Stage Description	Levels of Mastery	Time
<b>Preparatory</b>	Organizational matters (checking student attendance)	Familiarization	10 min.
	Review of tasks assigned for independent preparation	Perception	20 min.
	Control and assessment of students' entry-level knowledge in pharmacology	Reproductive	20 min.
<b>Main</b>	Development of professional skills (students identifying drug groups, mechanisms of action, main pharmacological effects, indications for use, possible side effects).	Comprehension Understanding	90 min.
	Practicing professional competence: solving and evaluating situational tasks	Practical application Exploratory creative activity	45 min.
	Knowledge consolidation	Reinforcement	5 min.
<b>Final</b>	Test control of final preparation level	Reproduction	20 min.
	Overall assessment of student learning activity	Familiarization	10 min.
	Informing students about the next lesson's topic and independent work assignments	Familiarization	5 min.

### **Recommended Literature**

#### **Basic:**

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 228-232, 603-621, 623-641.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updater. - Vinnytsia : Nova Knyha, 2018. – P. 172-185.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 532-552.



**Secondary:**

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

**Information Resources:**

1. Electronic Library Catalog (select guest login): [http://ek.librarynmu.com/cgi-bin/irbis64r\\_plus/cgiirbis\\_64\\_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU\\_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5](http://ek.librarynmu.com/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5)
2. Repository: <http://ir.librarynmu.com/>
3. LIKAR\_NMU Page: <https://likar.nmu.kiev.ua/md/course/view.php?id=1189>

**Questions for student self-preparation for the practical lesson:**

1. Concept of excitatory and inhibitory neurotransmitters in the CNS.
2. General characteristics of drugs that stimulate the CNS.
3. Antidepressants: Classification and pharmacological characteristics.
4. Nootropics: Classification and pharmacological characteristics. Comparison of the drugs piracetam, aminolone, vinpocetine, nicergoline, pentoxifylline, aminophenylbutyric acid, and Ginkgo biloba.
5. Psychostimulants: Classification. Pharmacological characteristics of sodium caffeine benzoate.
6. Analeptics: Classification. Pharmacological characteristics of caffeine citrate and sulcamphocaine.
7. Adaptogens: Classification and pharmacological characteristics of adaptogens of plant and animal origin.
8. Concept of psychodisruptors and amphetamines. Formation of dependence, social significance. Drugs that lead to dependence and toxicomania.
9. Pharmacological characteristics of drugs included in the "KROK-1. Pharmacy" exam: Amitriptyline, fluoxetine, piracetam, sodium caffeine benzoate.

**Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.**

**Topic 11. Hormonal medicines, their synthetic substitutes and antagonists (1).  
Hormonal medicines of protein and peptide structure, and amino acid derivatives, their synthetic analogs and antagonists.**

**Competencies:**

***Integral Competence:***

- Ability to solve problems of a research and/or innovative nature in the field of pharmacy.

***General competences (GC):***

- GC02. Knowledge and understanding of the subject area; understanding of professional activity.
- GC 03. Ability to communicate in the state language both orally and in writing.
- GC 04. Ability to communicate in a foreign language.
- GC 06. Ability to work in a team.
- GC 09. Ability to use information and communication technologies.
- GC 10. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty.

***Special (professional, subject) competences (PC):***

- PC01. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts.
- PC 02. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy.
- PC 03. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.
- PC 04. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying.
- PC 06. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient.
- PC 08. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics

**Purpose:** Acquisition by higher education students of theoretical knowledge and practical skills regarding hormonal drugs of protein, peptide structure, and amino acid derivatives, their synthetic analogs, and antagonists.

**Equipment:** safety instructions, interactive multimedia system (if needed), collection of pharmaceuticals, reference books.

### Lesson Plan and Organizational Structure

Stage Name	Stage Description	Levels of Mastery	Time
<b>Preparatory</b>	Organizational matters (checking student attendance)	Familiarization	10 min.
	Review of tasks assigned for independent preparation	Perception	20 min.
	Control and assessment of students' entry-level knowledge in pharmacology	Reproductive	20 min.
<b>Main</b>	Development of professional skills (students identifying drug groups, mechanisms of action, main pharmacological effects, indications for use, possible side effects).	Comprehension Understanding	90 min.
	Practicing professional competence: solving and evaluating situational tasks	Practical application Exploratory creative activity	45 min.
	Knowledge consolidation	Reinforcement	5 min.
<b>Final</b>	Test control of final preparation level	Reproduction	20 min.
	Overall assessment of student learning activity	Familiarization	10 min.
	Informing students about the next lesson's topic and independent work assignments	Familiarization	5 min.

### Recommended Literature

#### Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 408-421, 432-438, 448-454, 470-478.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updat. - Vinnytsia : Nova Knyha, 2018. – P. 334-357.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 667-702, 747-792.

**Secondary:**

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

**Information Resources:**

1. Electronic Library Catalog (select guest login): [http://ek.librarynmu.com/cgi-bin/irbis64r\\_plus/cgiirbis\\_64\\_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU\\_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5](http://ek.librarynmu.com/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5)
2. Repository: <http://ir.librarynmu.com/>
3. LIKAR\_NMU Page: <https://likar.nmu.kiev.ua/md/course/view.php?id=1189>

**Questions for student self-preparation for the practical lesson:**

1. Classification of hormonal medications, sources of production, and principles of biological standardization of finished medicinal products.
2. Pharmacological properties and characteristics of anterior pituitary hormonal drugs (tropic hormones): their effect on the activity of endocrine glands (mechanisms of action, classification, indications for use, side effects, contraindications).
3. Pharmacological characteristics of intermediate and posterior pituitary hormonal drugs: mechanisms of action, indications and contraindications for use, complications associated with their use.
4. Pharmacological properties and application characteristics of thyroid hormonal medications: complications and contraindications.
5. Mechanism of action of antithyroid agents, their side effects, and applications.
6. Principles of emergency management in thyrotoxic crisis and hypothyroid (myxedematous) coma.
7. Effect of calcitonin on calcium and phosphorus metabolism. Indications for use.
8. Characteristics of insulin and its synthetic and semisynthetic analogs: pharmacodynamics and pharmacokinetics. Indications and contraindications for use, dosage, and side effects. Main approaches to insulin therapy in diabetes mellitus.
9. Principles of emergency management in hyperglycemic and hypoglycemic comas.
10. Pharmacotherapy of type 2 diabetes mellitus: oral antidiabetic agents (classification, mechanism of action, complications associated with their use).
11. Pharmacological characteristics of medications included in the “krok-1. Pharmacy” exam: insulin, glibenclamide, levothyroxine, thiamazole (mercazolil), oxytocin.

**Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.**

**Topic 12. Hormonal medicines, their synthetic substitutes and antagonists (2).  
Hormonal medicines of steroidal structure and fatty acid derivatives: their  
synthetic analogs and antagonists.**

**Competencies:**

***Integral Competence:***

- Ability to solve problems of a research and/or innovative nature in the field of pharmacy.

***General competences (GC):***

- GC02. Knowledge and understanding of the subject area; understanding of professional activity.
- GC 03. Ability to communicate in the state language both orally and in writing.
- GC 04. Ability to communicate in a foreign language.
- GC 06. Ability to work in a team.
- GC 09. Ability to use information and communication technologies.
- GC 10. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty.

***Special (professional, subject) competences (PC):***

- PC01. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts.
- PC 02. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy.
- PC 03. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.
- PC 04. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying.
- PC 06. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient.
- PC 08. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics

**Purpose:** Acquisition of theoretical knowledge and practical skills regarding hormonal medications of steroidal structure and fatty acid derivatives, their synthetic analogs, and antagonists by higher education students..

**Equipment:** safety instructions, interactive multimedia system (if needed), collection of pharmaceuticals, reference books.

### **Lesson Plan and Organizational Structure**

Stage Name	Stage Description	Levels of Mastery	Time
<b>Preparatory</b>	Organizational matters (checking student attendance)	Familiarization	10 min.
	Review of tasks assigned for independent preparation	Perception	20 min.
	Control and assessment of students' entry-level knowledge in pharmacology	Reproductive	20 min.
<b>Main</b>	Development of professional skills (students identifying drug groups, mechanisms of action, main pharmacological effects, indications for use, possible side effects).	Comprehension Understanding	90 min.
	Practicing professional competence: solving and evaluating situational tasks	Practical application Exploratory creative activity	45 min.
	Knowledge consolidation	Reinforcement	5 min.
<b>Final</b>	Test control of final preparation level	Reproduction	20 min.
	Overall assessment of student learning activity	Familiarization	10 min.
	Informing students about the next lesson's topic and independent work assignments	Familiarization	5 min.

### **Recommended Literature**

#### **Basic:**

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 438-446, 455-465.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updatet. - Vinnytsia : Nova Knyha, 2018. – P. 334-357.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 703-746.

**Secondary:**

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

**Information Resources:**

1. Electronic Library Catalog (select guest login): [http://ek.librarynmu.com/cgi-bin/irbis64r\\_plus/cgiirbis\\_64\\_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU\\_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5](http://ek.librarynmu.com/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5)
2. Repository: <http://ir.librarynmu.com/>
3. LIKAR\_NMU Page: <https://likar.nmu.kiev.ua/md/course/view.php?id=1189>

**Questions for student self-preparation for the practical lesson:**

1. Classification of steroidal hormonal medications and fatty acid derivatives, sources of their obtaining, principles of biological standardization, and features of finished dosage forms.
2. Classification and general characteristics of adrenal cortex hormonal medications, as well as corticosteroid antagonists.
3. Classification and pharmacological properties of sex hormonal medications, their antagonists, and contraceptive drugs.
4. Anti-inflammatory, anti-allergic, and anti-shock properties of glucocorticoids. Features of their use and possible complications. Withdrawal syndrome: causes of development, ways to reduce the risk, and treatment if it occurs.
5. Effects of mineralocorticoids and their antagonists on water-salt metabolism. Pharmacological characteristics of mineralocorticoid use in adrenal insufficiency.
6. Hormonal medications of the gonads, their synthetic replacements, and antagonists: pharmacodynamics, indications for use, side effects, and contraindications.
7. Use of estrogenic and progestin medications in reproductive medicine. Concept of oral contraception.
8. Pharmacological properties and special considerations for prescribing anabolic steroids. Side effects and contraindications for their use.
9. Pharmacological characteristics of medications included in the "krok-1. Pharmacy" examination: prednisolone.

**Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.**

### **Topic 13. Anti-inflammatory and anti-allergic medicines.**

#### **Competencies:**

##### ***Integral Competence:***

- Ability to solve problems of a research and/or innovative nature in the field of pharmacy.

##### ***General competences (GC):***

- GC02. Knowledge and understanding of the subject area; understanding of professional activity.
- GC 03. Ability to communicate in the state language both orally and in writing.
- GC 04. Ability to communicate in a foreign language.
- GC 06. Ability to work in a team.
- GC 09. Ability to use information and communication technologies.
- GC 10. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty.

##### ***Special (professional, subject) competences (PC):***

- PC01. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts.
- PC 02. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy.
- PC 03. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.
- PC 04. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying.
- PC 06. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient.
- PC 08. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics

**Purpose:** Acquisition by higher education students of theoretical knowledge and practical skills regarding anti-inflammatory and anti-allergic medicines.

**Equipment:** safety instructions, interactive multimedia system (if needed), collection of pharmaceuticals, reference books.



### Lesson Plan and Organizational Structure

Stage Name	Stage Description	Levels of Mastery	Time
<b>Preparatory</b>	Organizational matters (checking student attendance)	Familiarization	10 min.
	Review of tasks assigned for independent preparation	Perception	20 min.
	Control and assessment of students' entry-level knowledge in pharmacology	Reproductive	20 min.
<b>Main</b>	Development of professional skills (students identifying drug groups, mechanisms of action, main pharmacological effects, indications for use, possible side effects).	Comprehension Understanding	90 min.
	Practicing professional competence: solving and evaluating situational tasks	Practical application Exploratory creative activity	45 min.
	Knowledge consolidation	Reinforcement	5 min.
<b>Final</b>	Test control of final preparation level	Reproduction	20 min.
	Overall assessment of student learning activity	Familiarization	10 min.
	Informing students about the next lesson's topic and independent work assignments	Familiarization	5 min.

### Recommended Literature

#### Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh; London; New York: Elsevier, 2020. – P. 93-105, 233-243, 343-351, 358-359.
2. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updatet. - Vinnytsia : Nova Knyha, 2018. – P. 143-159.
3. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 277-299; 321-338.

#### Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

### **Information Resources:**

1. Electronic Library Catalog (select guest login): [http://ek.librarynmu.com/cgi-bin/irbis64r\\_plus/cgiirbis\\_64\\_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU\\_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5](http://ek.librarynmu.com/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5)
2. Repository: <http://ir.librarynmu.com/>
3. LIKAR\_NMU Page: <https://likar.nmu.kiev.ua/md/course/view.php?id=1189>

### **Questions for student self-preparation for the practical lesson:**

1. General characteristics of anti-inflammatory and anti-allergic medicines.
2. ATC and other classifications of anti-inflammatory and anti-allergic medicines.
3. Pharmacological characteristics of anti-inflammatory and anti-allergic medicines.
4. Comparative characteristics of non-selective and selective COX inhibitors.
5. Specifics of prescribing NSAIDs in acute and chronic inflammation.
6. Gastrointestinal and thrombotic complications of NSAID therapy, their causes and mechanisms of development, and methods of prevention.
7. Comparative characteristics of antihistamines of the first, second, and third generations.
8. Emergency treatment for anaphylactic shock.
9. Pharmacological characteristics of medicines included in the "KROK-1. Pharmacy" exam: acetylsalicylic acid, sodium diclofenac, celecoxib, indomethacin, meloxicam, diphenhydramine hydrochloride, loratadine, chloropyramine.

**Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.**

## **Topic 14. Biopharmaceutical medicines.**

### **Competencies:**

#### ***Integral Competence:***

- Ability to solve problems of a research and/or innovative nature in the field of pharmacy.

#### ***General competences (GC):***

- GC02. Knowledge and understanding of the subject area; understanding of professional activity.
- GC 03. Ability to communicate in the state language both orally and in writing.
- GC 04. Ability to communicate in a foreign language.
- GC 06. Ability to work in a team.
- GC 09. Ability to use information and communication technologies.
- GC 10. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty.

#### ***Special (professional, subject) competences (PC):***

- PC01. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts.
- PC 02. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy.
- PC 03. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.
- PC 04. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying.
- PC 06. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient.
- PC 08. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics

**Purpose:** Acquisition of theoretical knowledge and practical skills regarding biopharmaceutical medications by higher education students

**Equipment:** safety instructions, interactive multimedia system (if needed), collection of pharmaceuticals, reference books.

### Lesson Plan and Organizational Structure

Stage Name	Stage Description	Levels of Mastery	Time
<b>Preparatory</b>	Organizational matters (checking student attendance)	Familiarization	10 min.
	Review of tasks assigned for independent preparation	Perception	20 min.
	Control and assessment of students' entry-level knowledge in pharmacology	Reproductive	20 min.
<b>Main</b>	Development of professional skills (students identifying drug groups, mechanisms of action, main pharmacological effects, indications for use, possible side effects).	Comprehension Understanding	90 min.
	Practicing professional competence: solving and evaluating situational tasks	Practical application Exploratory creative activity	45 min.
	Knowledge consolidation	Reinforcement	5 min.
<b>Final</b>	Test control of final preparation level	Reproduction	20 min.
	Overall assessment of student learning activity	Familiarization	10 min.
	Informing students about the next lesson's topic and independent work assignments	Familiarization	5 min.

### Recommended Literature

#### Basic:

1. Rang and Dale's Pharmacology / [H. P. Rang, J. M. Ritter, R. J. Flower et al.]. – [9th ed.]. – Edinburgh ; London ; New York : Elsevier, 2020. – P. 69-81, 249-251.
2. Katzung B. G. Basic and clinical pharmacology / B. G. Katzung, S. B. Masters, A. J. Trevor. – [14th ed.]. – The McGraw-Hill Companies, Inc., 2018. – P. 977-1002.

#### Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

#### Information Resources:

1. Electronic Library Catalog (select guest login): [http://ek.librarynmu.com/cgi-bin/irbis64r\\_plus/cgiirbis\\_64\\_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU\\_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5](http://ek.librarynmu.com/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5)
2. Repository: <http://ir.librarynmu.com/>
3. LIKAR\_NMU Page: <https://likar.nmu.kiev.ua/md/course/view.php?id=1189>

### **Questions for student self-preparation for the practical lesson:**

1. Definition and general characteristics of biotechnological products.
2. Sources of biotechnological medicinal products.
3. Immunogenicity of biotechnological medicinal products: causes and prevention methods.
4. Definition of "biosimilar": advantages and disadvantages.
5. Hybridoma technology as a method for producing monoclonal antibodies.
6. Classification of monoclonal antibodies by origin, structure, and target action.
7. Applications of monoclonal antibodies for diagnostic purposes.
8. Pharmacological properties and characteristics of monoclonal antibodies used in oncology.
9. Pharmacological properties and characteristics of monoclonal antibodies used in bronchial asthma and allergy.
10. Pharmacological properties and characteristics of biotechnological products used in blood disorders.
11. Pharmacological properties and characteristics of biotechnological products used in rheumatoid arthritis and other autoimmune diseases.
12. Hematopoietic growth factors: mechanism of action and indications for use.
13. Immunostimulants (colony-stimulating factors, interferons): mechanism of action, indications for use, and therapy complications.
14. Immunosuppressants (selective immunosuppressants,  $\text{tnf}\alpha$  inhibitors, interleukin inhibitors): mechanisms of action, indications for use, and therapy complications.
15. Emergency treatment for bleeding or hemorrhages resulting from overdose of direct oral anticoagulants.

**Methodical guide prepared by: Prof. Zaychenko G.V., Assoc. Prof. Hnatiuk V.V., Assoc. Prof. Savchenko N.V., Assist. Simonova O.A.**

## Topic 15. Vitamin preparations as medicines and micronutrients

### Competencies:

#### *Integral Competence:*

- Ability to solve problems of a research and/or innovative nature in the field of pharmacy.

#### *General competences (GC):*

- GC02. Knowledge and understanding of the subject area; understanding of professional activity.
- GC 03. Ability to communicate in the state language both orally and in writing.
- GC 04. Ability to communicate in a foreign language.
- GC 06. Ability to work in a team.
- GC 09. Ability to use information and communication technologies.
- GC 10. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty.

#### *Special (professional, subject) competences (PC):*

- PC01. Ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts.
- PC 02. The ability to collect, interpret and apply data necessary for professional activity, research and implementation of innovative projects in the field of pharmacy.
- PC 03. Ability to solve pharmacy problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.
- PC 04. Ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments in the field of pharmacy to specialists and non-specialists, in particular to people who are studying.
- PC 06. Ability to consult on prescription and over-the-counter drugs and other products of the pharmacy assortment, pharmaceutical care during the selection and sale of drugs of natural and synthetic origin by assessing the risk/benefit ratio, compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, and physicochemical properties and chemical features, indications/contraindications for use, guided by data on the health status of a particular patient.
- PC 08. Ability to monitor the effectiveness and safety of the population's use of medicines according to data on their clinical and pharmaceutical characteristics

**Purpose:** Acquisition of theoretical knowledge and practical skills regarding vitamin supplements as medicinal products and micronutrients by higher education students

**Equipment:** safety instructions, interactive multimedia system (if needed), collection of pharmaceuticals, reference books.

### Lesson Plan and Organizational Structure

Stage Name	Stage Description	Levels of Mastery	Time
<b>Preparatory</b>	Organizational matters (checking student attendance)	Familiarization	10 min.
	Review of tasks assigned for independent preparation	Perception	20 min.
	Control and assessment of students' entry-level knowledge in pharmacology	Reproductive	20 min.
<b>Main</b>	Development of professional skills (students identifying drug groups, mechanisms of action, main pharmacological effects, indications for use, possible side effects).	Comprehension Understanding	90 min.
	Practicing professional competence: solving and evaluating situational tasks	Practical application Exploratory creative activity	45 min.
	Knowledge consolidation	Reinforcement	5 min.
<b>Final</b>	Test control of final preparation level	Reproduction	20 min.
	Overall assessment of student learning activity	Familiarization	10 min.
	Informing students about the next lesson's topic and independent work assignments	Familiarization	5 min.

### Recommended Literature

#### Basic:

1. Pharmacology : textbook for students of medical higher educational institutions / V. M. Bobyrov, O. M. Vazhnicha, T. O. Devyatkina, N. M. Devyatkina; Ministry of health of Ukraine, Ukrainian medical stomatological academy. - 4th ed., updatet. - Vinnytsia : Nova Knyha, 2018. – P. 358-380.

#### Secondary:

1. Whalen, K. (Ed.). Lippincott Illustrated Reviews: Pharmacology / K. Whalen, R. Finkel, T. A. Panavelil. – [8th ed.]. – LWW., 2022.

#### Information Resources:

1. Electronic Library Catalog (select guest login): [http://ek.librarynmu.com/cgi-bin/irbis64r\\_plus/cgiirbis\\_64\\_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU\\_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5](http://ek.librarynmu.com/cgi-bin/irbis64r_plus/cgiirbis_64_ft.exe?C21COM=F&LNG=uk&I21DBN=NMU_FULLTEXT&P21DBN=NMU&Z21ID=&S21CNR=5)
2. Repository: <http://ir.librarynmu.com/>
3. LIKAR\_NMU Page: <https://likar.nmu.kiev.ua/md/course/view.php?id=1189>

**Questions for student self-preparation for the practical lesson:**

1. Definition of vitamin supplements. Types of vitamin therapy.
2. Classification of vitamin supplements.
3. General characteristics of water-soluble vitamin supplements.
4. Pharmacology of thiamine chloride (bromide), riboflavin, pyridoxine, niacin, cyanocobalamin, folic acid, ascorbic acid, and dexpanthenol.
5. Indications for use and side effects of water-soluble vitamin supplements.
6. Concept of bioflavonoids (rutin, quercetin), coenzyme preparations.
7. General characteristics of fat-soluble vitamin supplements.
8. Pharmacology of retinol acetate, ergocalciferol, tocopherol acetate, and phytonadione.
9. Indications and contraindications for the use of fat-soluble vitamin supplements.
10. Side effects of fat-soluble vitamin supplements. Concept of antivitamin.
11. Multivitamin supplements.
12. Pharmacological characteristics of medications included in the "krok-1. Pharmacy" examination: retinol acetate, ergocalciferol, cholecalciferol, ascorbic acid, cyanocobalamin, niacin, menadione.

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