Approved
At the meeting of the Committee
of the Faculty of Pharmacy
Minutes Nr. 4 as of 12. 06 2014
Dean of the Faculty of Pharmacy,
Dr, associate professor N. Ciobanu

Approved
At the meeting of the Pharmacology
and Clinical Pharmacy Department
Minutes Nr. 10 as of 06.06.2014
Head of Department,
Dr.Hab, professor, V. Gonciar

SILLABUS FOR STUDENTS

OF PHARMACEUTICAL FACULTY

Name of the course: **PHARMACOLOGY**

Code of the course: **S.05.O.051, S.06.O.059**

Type of course: **Compulsory discipline**

Total number of hours – 170h,

Out of which 68h – lectures, 102h – practical works;

Number of credits allocated to the course: **8 credits**

Name of authors that teach the course: **Dr. Hab., professor V. Gonciar**

CHISINAU, 2014

I. The purpose of the subject of Pharmacology:

The pharmacist must build work skills with informative pharmacology literature, with annotations drug substances (ADS) also focus on medical guidelines; generalize information about traditional and new drug substances, which are put on sale in the pharmaceutical market and inform about this doctors, pharmacies and public workers; pay special attention to "List of vital important and essential drug substances", main and additional drugs, and also possess information about pharmacoeconomic costs for specific disease prevention.

II. Training objectives for the subject of Pharmacology:

At the level of knowledge and understanding:

- To learn the general principles for the formulation of recipes and compilation of prescriptions;
- To analyze the action of drug substances according to the totality of pharmacological features (pharmacokinetics), location and mechanism of action (pharmacodynamics);
- To appreciate the possibilities of using drugs with therapeutic purpose based on knowing its specific features (side effects, indications and contraindications).

Upon completion of the subject the student will be able to know:

- Pharmacology content and its tasks, the history of pharmacology.
- Sources of obtaining drugs and stages of implementation in medical practice.
- General rules of prescribing drugs (pharmacography), pharmaceutical forms of drugs and their destination, prescribing drugs in different pharmaceutical forms.
- General pharmacology. Pharmacokinetics and pharmacodynamics of drugs.
- Principles of drug classification. Groups of drugs according to the systemic classification, etc.
- Drug classification within the group. Membership of the drug in pharmacological group according to the mechanism of action, chemical structure etc. The international names of the pharmaceutical preparations and their most spread commercial names. Pharmacokinetics. Pharmacodynamics.
- Characterization of certain compulsory drugs. Mechanism of action, effects, side effects, indications, contraindications.
- Comparative presentation of drugs within a certain group; biological standardization of drugs.

At the level of practical use:

- To determine membership of the preparation in pharmacological group.
- To select drugs which are indicated in certain diseases.
- To select certain indications for certain drug.
- To be able to replace one drug with another substance, analogue if necessary.

- To possess the ability to select information from the speciality literature (guide, manuals, pharmacotherapeutic guide etc.)
- To inform the patient about the rational administration of drug substances, about the possible negative secondary reactions and measures of removing them.

At level of integration:

- To determine the position and importance of pharmacology across the disciplines of the curriculum (of pharmaceutical profile, physiology, human physiology, biochemistry, microbiology etc.);
- To use knowledge gained from other disciplines in interdisciplinary integration of pharmacology;
- To acquire theoretical and practical knowledge about drugs as a point of reference for their further utilization in pharmaco- and phytotherapy (pharmacy) and in medical practice;
- To use the knowledge gained at pharmacology, to organize and carry out the providing of population with drugs.

III. Preliminary terms and requirements:

Pharmacology is the fundamental science of pharmacy and medicine, which has a social significance for prevention and treatment of most diseases. Pharmacology plays a guiding role in the development and production of new efficient drug substances; it performs biological standardization, develops principles for rational and effective use of drug substances. Pharmacist needs pharmacology in order to organize and perform uninterrupted supply of the population with drugs. In his professional activity pharmacist meets a huge number of drugs and their synonyms, that's why it is very important for him to assimilate various types of classification of drug substances.

Pharmacology as a necessary and important discipline in preparing future pharmacists brings together knowledge from many areas of medical and biological disciplines and clinician's experience of practical use of medicines, which are constantly being perfected by doctors in light of the progress of experimental and clinical pharmacology.

Pharmacology is based on the knowledge gained in the process of studying the fundamental sciences (human physiology – helps to determine body condition in physiological states, pathophysiology – body condition in pathological states, biochemistry - pharmacokinetics of drugs, entered the body, clinical disciplines), pharmaco- and phytotherapy, which require the determination of the main directions and tasks of pharmacological intervention in diseases; analysis of pharmacological groups of drugs and special preparations used for etiotropic, pathogenetic and symptomatic treatment; characterization of preparations, main action of which is to correct the altered function of effective systems and principles of drug treatment, taking into account the clinical manifestations and evaluation versions of the disease; forecasting the possible undesirable effects of preparations.

IV. The basic content of the course:

A. Lectures:

Nr.	Subject	Hours
1.	Introduction. General Pharmacology.	2
2.	General Pharmacology.	2
3.	General Pharmacology.	2
4.	Introduction to pharmacology of the autonomic nervous system. Cholinergic agonists. Cholinergic antagonists. Anticolinesterases.	2
5.	Adrenergic agonists.	2
6.	Adrenergic antagonists. Sympatholytics.	2
7.	Ethyl alcohol. Hypnotics. Symptomatic anticonvulsants. Antiepileptic and antiparkinsonian drugs.	2
8.	Opioid analgesics (narcotic analgesics) and non-opioid analgesics (antipyretics). Mixed analgesics.	2
9.	Psychotrops – part I (psycholeptics).	2
10.	Psychotrops – part II (psychoanaleptics).	2
11.	Medication of the bronchopulmonary system.	2
12.	Cardiotonic and cardiostimulatory drugs.	2
13.	Antihypertensive drugs. Antihipotensive drugs. Medication of cerebral blood flow disorders.	2
14.	Antianginal and antiarrhythmic drugs.	2
15.	Medication of blood.	2
16.	Medication of the gastrointestinal tract. (part I)	2
17.	Medication of the gastrointestinal tract. (part II)	2
18.	Diuretics. Antigout drugs. Medication of water-electrolyte and acid-base imbalance.	2
19.	Hormonal and anti-hormonal preparations. (part I)	2
20.	Hormonal and anti-hormonal preparations. (part II). Medication of reproductive system.	2
21.	Vitamins. Enzymes and antienzymes used as medicines.	2
22.	Anti-inflammatory drugs.	2
23.	Anti-allergic drugs. Immunomodulatory drugs.	2
24.	Disinfectants and antiseptics. Chemotherapy principles.	2
25.	Antibiotics (part I).	2
26.	Antibiotics (part II).	2
27.	Sulfonamides and other synthetic antimicrobial drugs.	2
28.	Anti-tuberculosis, anti-leprosy and anti-spirochetosis drugs.	2
29.	Antiviral drugs.	2
30.	Antifungal drugs.	2

31.	Antiprotozoal drugs.	2
32.	Antihelminthic drugs.	2
33.	Side effects and pathological states caused by drugs.	2
34.	The general principles of treatment of acute drug intoxication.	2

B. ***Practical classes:***

Nr.	**Subject**	**Hours**
1.	General prescription. Prescription of solid dosage forms.	3
2.	Semisolid dosage forms. Oral solutions and topical solutions.	3
3.	Parenteral solutions. Extractive solutions.	3
4.	**Summarizing the theme: « General prescription»**	3
5.	General Pharmacology. (part I) Pharmacokinetics.	3
6.	General Pharmacology. (part II) Pharmacodynamics.	3
7.	Introduction to pharmacology of the autonomic nervous system. Cholinergic agonists. Cholinergic antagonists. Anticolinesterases.	3
8.	Adrenergic agonists.	3
9.	Adrenergic antagonists. Sympatholytics.	3
10.	**Summarizing the theme: « Drugs influencing efferent innervation»**	3
11.	Ethyl alcohol. Hypnotics. Symptomatic anticonvulsants. Antiepileptic and antiparkinsonian drugs.	3
12.	Opioid analgesics (narcotic analgesics) and non-opioid analgesics(antipyretics). Mixed analgesics.	3
13.	Neuroleptics. Tranquilizers. Lithium salts. Sedatives.	3
14.	Psychostimulants. Nootropics. Antidepressants. Adaptogens.	3
15.	**Summarizing the theme: « Drugs influencing the central nervous system»**	3
16.	Medication of the bronchopulmonary system.	3
17.	Cardiotonic and cardiostimulatory drugs.	3
18.	General anesthetics. Drugs influencing afferent innervation.	3
19.	Antihypertensives .Antihipotensives.	3
20.	Antianginal and antiarrhythmic drugs.	3
21.	Diuretics. Antigout drugs. Medication of water-electrolyte and acid-base imbalance.	3
22.	Medication of blood.	3
23.	Medication of central and peripheral blood flow disorders. Hypolipidemic drugs.	3
24.	Medication of the gastrointestinal tract.	3
25.	**Summarizing the theme: «Drugs influencing the functions of bronchopulmonary, digestive and cardiovascular systems»**	3
26.	Hormonal and anti-hormonal preparations. Medication of reproductive	3

	system.	
27.	Vitamins. Enzymes and antienzymes used as medicines.	3
28.	Anti-inflammatory drugs. Anti-allergic and immunomodulatory drugs.	3
29.	Disinfectants and antiseptics. Chemotherapy principles.	3
30.	Antibiotics.	3
31.	Sulfonamides and other synthetic antimicrobial drugs. Anti-tuberculosis, anti-leprosy and anti-spirochetosis drugs.	3
32.	Antiprotozoal, antiviral, antifungal and antihelminthic drugs.	3
33.	**Summarizing the theme: « Antimicrobial drugs »**	3
34.	Side effects and pathological states caused by drugs. The general principles of treatment of acute drug intoxication.	3

V. Reccommended literature:

A. Mandatory:

1. Kharkevitch D.A.. Pharmacology. Textbook for medical students. – 9A edition, revised and improved.- Moscow, GEOTAR-Media Publishing Group, 2008, 672 p.
2. Brunton. Goodman Gilman Pharmacological Basis of Terapeutics. Graw-Hill, 2005.
3. Nicolai S., Melnic S., Scutar C., Cazacu V. Practical prescribing. Chisinau, Polygraphic Editorial Centre Medicina, 2004, 106 p.

B. Additional:

1. V.Gonciar, Ed. Keptya, C.Scutari (et al). Methodical indications for practical work in pharmacology: ((Fac. of Stomatology) / State Univ. of Medicine and Pharmacy "N.Testemitanu" Ch., CEP "Medicina", 2011, 83 p.
2. Katzung B. USMLE ROAD MAP Pharmacology.-New-York, 2003.
3. Stringer Y. Basic concepts in pharmacology a student's survival guide. - 2nd ed., Boston, 2001.

VI. Teaching and learning methods to be used:

Test (prescribing of recipes, instructions, testing Editor) written for highlighting the initial level of knowledge; Practical activities (working in a group) solving the problems of situation, Editor tests, demonstrating the video. Knowledge verification on questions of methodical guidelines and implementation of tasks for the next theme of practical work (working independently from home).

Final: thematic colloquium (Semester V) and Exam (Semester VI)

VII. Suggestions for individual work:

From the pedagogical point of view, one of the most effective methods for learning the material studied in the course of exposure and making practical pharmacology lessons is extensive use of audio-visual media of instruction in the form of slides, the tables, charts, figures, movie of cinema, video or audio tape.

To be successful in learning pharmacology student should try to be more practical in specifying each objective, to argue what he wants to achieve through his study stating which will be the final result. Learning act begins with setting learning objectives: what to be learned and at what level, what student must know and be able to do at the end of the learning act. Learning motivation is given on the extent of student's responsiveness towards knowledge and employability in learning activity.

Learning motivation represents the energetic dynamic and directional basis of the whole learning process. It is vital for effective learning, motivation representing the motor of the entire behavior, and therefore of the learning. One of the important factors that ensure control, dynamics and learning progress, directly influencing the motivational system of learning is the continuous knowledge of learning outcomes. This factor acts as a motivational source and element of guidance and safety in the learning process, causing the enhancement of student's activism in relation to learning tasks.

A major importance in the effective assimilation of subject material is rational management time. According to the requirements in effect for each working hour in direct contact with professor, student must work individually 1-2 hours. Thus, for the sufficient acquisition of discipline of Pharmacology, student of Pharmacy faculty will work individually at least 7 hours per week.

VIII. Evaluation methods:

- As the model can be applied the following organizational structure of making the laboratory works (practical lessons) in pharmacology:
- Motivation (topicality). Determination of the purpose of practical work, answering the students' questions.
- Thesis (testing) written to highlight the initial level of knowledge.
- Practical activities: solving the problems of situation the questions of methodological indications for laboratory work in Pharmacology (Faculty of Pharmacy), conducting experiments on laboratory animals, demonstration of video materials.
- Conversation with questions from methodical guidelines, analysis of experimental results.
- The final knowledge testing and assigning the tasks for the next theme of practical work (independently homework).

On the Pharmacology subject during the school year, there are 5 Summarizing evaluations, as follows:

1. Summarizing evaluation " General prescription ";
2. Summarizing evaluation " Drugs influencing efferent innervation ";
3. Summarizing evaluation " Drugs influencing the central nervous system ";
4. Summarizing evaluation " Drugs influencing the functions of bronchopulmonary, digestive and cardiovascular systems ";
5. Summarizing evaluation " Antimicrobial and antiparasitic drugs ".

Thus the formative evaluation consists of 5 summarizing evaluations. Each summarizing evaluation is marked separately with marks from 0 to 10 and can be supported by 2-3 times. The annual average is formed by the amount of points accumulated during the study divided by 5.

Summarizing evaluation consists of 3 questions of self-training, 3 exercises of drug prescription and three indications for the use of appropriate drugs. Students with grades for current evaluation lower than "5" are not admitted to the final examination, as well as students who did not recover absences from lectures and practical works.

Pharmacology discipline examination (summative assessment) is a the combined test consists of multiple-choice test (version "Test Editor" USMF "Nicolae Testemiţanu") and the oral exam (oral test).

The oral test (oral exam) is performed by including ticket with 4 questions from pharmacology discipline. Practical skills include 4 exercises of drug prescription and 4 indications for use of the appropriate drugs. The student has 30 minutes to prepare the answer. The test is evaluated with marks of 0 to 10.

The exam subjects (tests, questions of self training and the list of drugs and their indications) are approved by the department and presented to the students at least one month before the session. The final mark consists of 4 components: the annual average mark (coefficient 0.3), the practical skills (coefficient 0.2), the oral test (coefficient 0.3), the multiple-choice test (coefficient 0.2). Knowledge assessment is appreciated with grades from 10 to 1 without decimals as follows:

Method of marks rouding

The weighted sum of marks from current assessments and final examination	**The final mark**
5	**5**
5,1-5,5	**5,5**
5,6-6,0	**6**
6,1-6,5	**6,5**
6,6-7,0	**7**
7,1-7,5	**7,5**
7,6-8,0	**8**
8,1-8,5	**8,5**
8,6-9,0	**9**
9,1-9,5	**9,5**
9,6-10	**10**

The absence at the exam without due cause shall be recorded as "absent" and is equivalent to grade 0 (zero). The student has the right to 2 repeated allegations of examination failed.

IX. Language of the course: Romanian.