Approved

At the meeting of the Faculty Council **Medicine Nr. 2**
Minutes No. 4 of 25.03.2014.

Dean of the Faculty **Medicine Nr. 2**
PhD, associate prof _____ **M. Betiu**

Approved

At the meeting of the **chair Human Physiology and Biophysics**
Minutes No. 14 of 10.03.14

Head of the chair,
PhD, professor _____ **V. Ghicavii**

SYLLABUS

Course Title: Pharmacology
Course code: F.05.0.038
Course Type: Compulsory
Total hours -170 hours
University lectures-68 hours, seminar hours -102
Number of credits provided for the course units: 11

The teaching staff of the department:
Professor Victor Ghicavii
Associate Professor Ecaterina Stratu
Associate Professor Vadim Gavriluta
Associate Professor Ina Pogonea
Asist. Ianos Coretchi
Asist. Tatiana Chiriac

Chisinau, 2014

I. Objectives of the course on Pharmacology:

Study of pharmacokinetics and pharmacodynamics parameters of legal drugs, their interaction with the human body, training to prescribe and administer proper, effective and safe drugs in the treatment of various diseases and pathological conditions.

Training objectives of the discipline Pharmacology:

II. At the level of knowledge and understanding:

- To know the structure of a prescription and the principles of prescription of medicines in different drug forms;
- To identify the concept of drug, raw materials, drug substance and drug form, drug nomenclature;
- To identify drug interactions and incompatibilities;
- To know basic principles of classification of drugs;
- To know basic principles of general pharmacokinetics and pharmacodynamics and special pharmacology, pharmacography and pharmacogenetics;
- To acquire knowledge of groups of drugs and binding preparations, to prescribe a drug in different forms;
-To report on classification, mechanism of action, effects, indications, contraindications and side effects of drugs and specific groups of medicines;
- To know groups of drugs: definition, classification;
- To know members of certain groups of chemicals, substances pharmacodynamics (mechanism and site of action, effects, indications and contraindications, side effects and toxicity) substances pharmacokinetics (route of administration, elimination). Comparative characteristics of medical preparations.
- To assess possibilities to use drugs for medical purposes based on the knowledge of their properties.

At the application level:

- To select and prescribe medicinal preparations in various diseases and pathological conditions;
- To examine and describe pharmacological effects in experimental studies;
- To be able to apply the principles of cause and effect (dose-effect), benefit-injury;
- To apply gained knowledge in solving problems and test cases;
- To be able to solve emergency cases;
- To select the most effective ways of drug administration based on their pharmacokinetic and pharmacodynamic properties, with prevention of interactions, incompatibilities and complications of medical treatment;
- To apply the rules of writing out a prescription and to write the obligatory drugs in all medical forms;
- To prescribe a medication of choice in various diseases and emergencies taking into consideration their pathogenesis;
- To apply the principles of dosing and routes of drug administration depending on the age of a patient;
- To determine drugs which are contraindicated for patients with different enzymopathies;
- To establish clinical and basic symptoms of drug poisoning, first aid measures, antidotes and general principles of treatment, methods of neutralization of toxins absorbed into the body and recovery of disturbed functions;
- To carry out biological standardization of a preparation;

- To be able to select and administer several drugs simultaneously without any risk of incompatibility;
- To administer a proper medication depending on biological rhythms;
- To be able to solve clinical cases;
- To be quick to substitute a drug for another one from the same group to minimize side effects and make the treatment available;
- To apply the method of determination of renal and hepatic clearance; therapeutical index of a drug in experimental and clinical conditions;
- To determine the dose-effect relationship and bioavailability of drug preparations;
- To be able to take optimal decisions in emergency aid in cases of overdose or inadequate reactions to drugs.

- At the level of integration

- To assess the importance and role of pharmacology in the context of general medical care and its integration into related disciplines;
- To apply medical and biological knowledge in learning pharmacology;
- To establish correlations between physiological and pathological processes and pharmacological properties of drugs;
- To formulate basic principles of ethics and deontology in medical treatment (pharmacotherapy);
- To elaborate research programs to develop new drugs and study further known medical substances;
- To be able to implement and integrate the acquired knowledge of pharmacology in clinical disciplines;
- To be able to assess and self-assess acquired knowledge in the field;
- To be able to acquire pharmacological news:

III. Provisional terms and conditions

Pharmacology that is a preclinical discipline studied at the University stage, contributes to obtaining basic knowledge of pharmacokinetics and pharmacodynamics of drugs to be able to prescribe medical substances properly, effectively and safely in the treatment of various diseases and pathological conditions; to assess necessary information for a correct choice of drugs and their rational use; to foresee and prevent side effects of pharmacological therapy; to develop necessary skills to avoid drug poisoning and to deal with emergency cases fast and properly.

Pharmacology is a field of medicine that develops constantly and reflects progress in medical, biological, technical and pharmaceutical sciences. As a result, tens of new, original drugs and hundreds of generical drugs with new commercial names in different medical forms appear annually on the pharmaceutical market. Nowadays, there are about 50,000 drugs and their systematization becomes more and more difficult. Pharmacology helps students to systematize the most important groups of drugs, to consider the action of drugs based on their pharmacological properties, mechanisms and place of action; to assess possibilities to use drugs for medical purposes based on the knowledge of their properties; to be able to prescribe drugs in different diseases and pathological conditions, especially in emergency situations, taking into consideration drug pharmacokinetic and pharmacodynamic parameters.

The main content of the course:

IV Lectures

A. Lectures

Nr.	Theme	Number of hours
1	**Pharmacology and its importance. Its relations with other disciplines. Development of drugs. Parts of Pharmacology and its main branches. Pharmacology in Moldova. History.**	2
2	**General pharmacokinetics. Pharmacogenetics.**	2
3	**General Pharmacodynamics.**	2
4	**Cholinomimetics and anticholinesterases.**	2
5	**Cholinoblockers.**	2
6	**Adrenomimetics and dopaminomimetics**	2
7	**Adrenoblockers, dopaminoblockers and sympatholytics.**	2
8	**General and local anesthetics. Astringent, mucilaginous, adsorbent and irritating drugs**	2
9	**Opioid and nonopioid analgesics**	2
10	**Ethanol. Hypnotics, anticonvulsants, antiepileptics, antiparkinsonic drugs.**	2
11	**Psyholeptics: Antipsychotics. Anxiolitics. Sedatives. Lithium salts.**	2
12	**Psychoanaleptics: Antidepressants. CNS Excitants. Nootropics. Analeptics. General tonic and adaptive drugs.**	2
13	**Drugs acting on the respiratory system.**	2
14	**Antiarrhythmics.**	2
15	**Glycosides and tonicardiac drugs**	2
16	**Vasodilators (antihypertensive) and vasoconstrictors (antihypotensive)**	2
17	**Regional and local vasodilator medication**	2
18	**Diuretics. Drugs used in nephrolithiasis, gout and drugs with influence on acid-base balance**	2
19	**Drugs influencing haemopoiesis.**	2
20	**Drug substances influencing platelet aggregation, fibrinolysis, and blood coagulabillity.**	2
21	**Drugs acting on digestive functions**	2
22	**Drugs acting on digestive functions**	2
23	**Anti-inflammatory medication**	2
24	**Anti-allergic medication and drugs with influence on immune processes.**	2
25	**Hormonal and anti-hormonal preparations**	2
26	**Hormonal and anti-hormonal preparations Ocitocics and tocolytics.**	2
27	**Vitamin preparations and vitaminoids. Enzymes used as medicines. Antienzymes and antiatherosclerotic remedies. Drugs used in osteoporosis and obesity.**	2
28	**Antiseptics and disinfectants. Antibiotics.**	2
29	**Antibiotics. Sulfonamides**	2
30	**Antibacterial chemotherapeutic compounds with diverse chemical structure. Antituberculous and antileprous drugs.**	2

31	**Antiviral, antispirochetous and antifungal medications.**	**2**
32	**Antiprotozoal and anthelmintic drugs.**	**2**
33	**Anticancer drugs, radioprotective and radiopac remedies.**	**2**
34	**Side effects of drugs. Basic principles of treatment of acute poisonings. Drugs interactions.**	**2**

Practical classes:

Nr.	**Theme**	**Number of hours**
1	**Prescription order. Introduction. Prescriptions of solid and semisolid forms of drugs.**	3
2	**Liquid forms of drugs and injections.**	3
3	**Test*:* general prescription**	3
4	**General pharmacokinetics. Pharmacogenetics.**	3
6	***General pharmacodynamics.*** ***test:*** **general pharmacology.**	3
7	**Cholinomimetics and anticholinesterases.**	3
8	**Cholinoblockers**	3
9	**Adrenomimetics and dopaminomimetics.**	3
10	**Adrenoblockers, dopaminoblockers and sympatholytics.**	3
11	**Test on Neurotrops: Remedies influencing peripheral innervation (Cholinomimetics and anticholinesterases, Cholinoblockers, Adrenomimetics, dopaminomimetics, Adrenoblockers, dopaminoblockers and sympatholytics. Local anesthetics, astringent, mucilaginous, adsorbent and irritating medicinal remedies.**	3
12	**Opioid and nonopioids Analgesics, General anesthetics**	3
13	**Ethanol. Hypnotics, anticonvulsants, antiepileptics, antiparkinsonic drugs.**	3
14	**Psycholeptics: Antipsychotics. Anxiolytics. Sedatives.** **Lithium salts.**	3
15	**Psychoanaleptics: Antidepressants. CNS Excitants. Nootropics. Analeptics. General tonic and adaptive drugs.**	3
16	**Test *on "Remedies influencing the CNS system:* Opioid analgesics and non opioids. General anesthetics". .** **Ethanol. Hypnotics, anticonvulsants, antiepileptics, anti-Parkinson drugs. Psycholeptics: Antipsychotics. Anxiolitics. Sedatives. Lithium salts.** **Psychoanaleptics Antidepressants. CNS excitants. Nootropics. Analeptics. General tonic and adaptive remedies**	3
17	**Drugs acting on the respiratory system.**	3
18	**Antiarrhythmics**	3
19	**Glycosides and cardiotonic drugs**.	3
20	**Medication with vasodilators (antihypertensive) and vasoconstrictors (antihypotensive)**	3
21	**Regional and local vasodilator medication**	3
22	**Diuretics:. Drugs used in nephrolithiasis, gout treatment and their influence on acid-base balance**	3

23	**Drug substances influencing platelet aggregation, fibrinolysis, and blood coagulabillity.**	3
24	**Drugs acting on the digestive system.**	3
25	**<u>Test</u> " medicinal substances acting on effector function of organs and systems" (drugs acting on respiratory system. Antiarrhythmics. Glycosides and cardiotonic drugs. Vasodilator (antihypertensive) and vasoconstrictor (antihypotensive) medication . Regional and local vasodilators. Diuretics. Drugs used in nephrolithiasis, gout and their influence on acid-base balance. Drugs influencing haemopoiesis, platelet aggregation, blood coagulability and fibrinolysis. Drugs acting on the digestive system)**	3
26	**Anti-inflammatory medication.** **Antiallergic medication and drugs with influence on immune processes.**	3
27	**Hormonal and anti-hormonal substances**	3
28	**Hormonal and anti-hormonal substances. Tocolytics and oxytocins.**	3
29	**<u>Test</u> "Drugs affecting inflammatory, immune and metabolic processes''**	3
30	**Antiseptics and disinfectants. Antibiotics**	3
31	**Antibacterial substances with diverse chemical structures.** **Antituberculous drugs, antileprous drugs**	3
32	**Antiviral, antispirochetous and antifungal medication**	3
33	**Antiprotozoal and antihelmintic drugs.**	3
34	**Anticancer drugs, radioprotective and radiopaque remedies. Side effects of drugs. Basic principles of treatment of acute poisoning. Drugs interactions.** **<u>Test</u>. Antibacterial drugs. Antiparasitic drugs".**	3

V. Recommended literature:

A. Compulsory:

a) in Romanian

1. Ghicavîi V., Bacinschi N. şi al. „Farmacologie", Chişinău 2010
2. Harchevici D. A. „Farmacologia". CEP. Medicina, Chişinău. 2008
3. Ghicavîi V. şi al., „Farmacologia, Teste de autoevaluare". Chişinău, 2001
4. Bacinschi N. Gonciar V "Medicamentele utilizate in maladiile tubului digestiv". Chisinau, 1997
5. Fulga I. "Farmacologie." Bucuresti, 2006
6. Ghicavîi V. si colab.. "Indicatii metodice pentru lucrari de laborator la farmacologie" Chisinau, 2006
7. Harchevici D.A."Indreptar pentru lucrari de laborator la farmacologie." Chisinau, "Universitas", 1993
8. C.L Matcovschi C.L., Ghicavîi V. si al. "Manual de receptura". Chisinau, 2003
9. N. Gutu "Farmacotoxicologia". Chisinau, 1998
10. Matcovschi C. si al. "Ghid farmacoterapeutic". Chisinau, 2010
11. Muhin E., Ghicavîi V., V. Gonciar, Bacinschi N. "Medicatia dereglarilor circulatiei cerebrale si periferice". Chisinau, 1988

12. Anca-Dana Buzoianu "Pharmacologia", v. I, II, Editura medicală universitară „Iuliu Haţieganu”, Cluj-Napoca, 2006.

b) in Russian

1. Харкевич Д. А. "Фармакология. М. "Медицина», 2010
2. Харкевич Д. А. "Руководство к лабораторным занятиям по фармакологии. М., Медицина, 1988
3. Маркова И.В., Неженцев М.В. "Фармакология. Санкт-Петербург, 1994
4. Машковский М. Д. "Лекарственные средства", М., "Медицина», 2010

c) in French

1. Andre Herchueiz / Special Pharmacologie. vI, II, III, IV, universitaeres Presses de Bruxelles, 2008.
2. M. M. Bessard, / Cours of pharmacologie / 1987
3. Ghicavîi V., E. Stratu, Gavril V. Bacinschi N., I. acre, T. Chiriac, L. Serbeniuc "Indications pour les travaux methodiques the Laboratoire a la pharmacologie" CEP "Medicine." Chisinau, 2006.

d) in English

1. Richard A. Harvey, Pamela C. Champ, Mary J. Mycek and other. Lippincott’s Illustrated Reviews, Pharmacology, 2nd edition. 2000.
2. Anthony J. Trevor, Bertman G. Katzung, Susan B. Masters. Katzung & Trevor’s Pharmacology. Examination & Board Review. Sixth Edition, 2002.
3. Rang HP, Dale MM, Ritter JM Pharmacology, Fouth Edition. Chuchill Livingstone. 1999.
4. Alfred Goodman Gilman, Louis S. Goodman, Alfred Gilman. "The Pharmacological Basis of Therapeutics." Mc Graw Hill 2005.
5. Ghicavîi V. Bacinschi N., N. Gutu, Stratu E., Gavriluţa V., Pogonea I. V. Coreţchi I.., T. Chiriac, I. acre "Methodical indications for pharmacology laboratory works" CEP "Medicine." Chisinau, 2005.

Further reading

1. Cristea Aurelia –Nicoleta „Tratat de Farmacologie”, Bucureşti, 2005
2. Cristea Aurelia-Nicoleta „Farmacologie generală”. Bucureşti,2004
3. Stroescu V. „Bazele farmacologice ale practicii medicale”. (vol. I, II) "Editura medicala", Bucureşti, 2004
4. Nichifor M., Scutariu M., „Farmacologia şi farmacoterapia sinapsei periferice”. Iaşi, 2005
5. Patraş X. Mungiu O. „Miorelaxantele”. Iaşi, 2003
6. Plauchitiu Mihai „Transparent de Farmacologie şi Toxicologie”. Arad, 1999

7. Бачинский Н. Г. и др. "Фармакология (Методические рекомендации для самостоятельной работы студентов) Кишинев, 1998
8. Гикавый В. И. Синонимы, аналоги и взаимодействия лекарств. Кишинев. "Штиинца» 1993
9. Гикавый В. И., Бачинский Н. Г. Справочник симптоматических лекарственных средств. Кишинев 1995
10. Victor Ghicavîi „.Medicamente şi utilizarea lor raţională”, Chişinău, 2004
11.Victor Ghicavîi„Medicamentul – beneficiu sau prejudiciu”, I.S.F.E.P. „Tipografia centrală”, Chişinău, 2009
12. Dr. C. Matkovshi, / Cours of pharmacologie / Vientiane, 1980
13. Heinz Lullmann etc. / Atlases of pharmacologie Poch /, Paris, 1996, 2exemplare;
14. Rene Ndoze Moses Oliveira et alle / Dictionnaire therapeutique /, Edition atrique francophone, Digest, Medicine, 2000

15. Izes Landrut, Jean Pierre Gies / Pharmacologie. The therapeutic indication cible vers l'/ Paris, 2003.
16. Richard A. Harve Pamela C. 2 Champ Pharmacology-end edition is 2000,
17. Rational drug use: Consumer education and information (World Health Organization – 1996)
18. . Friderich Mezers H. Ernest Heavy Jamets of Medical Pharmacology (1990)
19. D. G. Grahame-Smith, J. K. Aronson. Oxford Textbook of Clinical Pharmacology and Drugs Terapy. Third Edition. Oxford University Press. 2002.

VI. Teaching and learning methods

Pharmacology is taught in a classical manner: lectures and practical work. Lectures are read by the professors of the department. At practical seminars students deepen, and summarize theoretical knowledge acquired during the lectures and self-learning. It is necessary to mention that at the lectures students become familiar with the material. The role of practical seminars is to transform the process of familiarization and perception in learning. Laboratory work is designed to provide students with research skills, including certain methods of research and scientific analysis. Laboratory work forms skills and professional knowledge.

During practical seminars, students are taught to form their own opinion, to insist on it, and to appreciate other opinions. The goal of laboratory work is also to check student's knowledge on a current theme.

Laboratory must change students' concept "I know" to "I can".

Before planning a practical seminar, one must answer the basic questions:

• Methods used to work with the students in the laboratory

Firstly, laboratory work provides all information to help students to form skills and professional knowledge; secondly, theoretical issues of primary importance for study of the subject are discussed.

Taking into consideration the goals that laboratory work must achieve, it is recommended: teachers to organize consultations for students to determine the most important information on the subjects;

I. Laboratory work begins with the general characterization of a theme and its relevance, determines purposes and problems of the laboratory work, and practical skills needed to study other new topics of pharmacology. It also reveals the degree of importance of knowledge of the theme for medical practice.

II. Simultaneously, teacher points out difficulties students may face during the preparation for laboratory work and answer any unclear questions. The teacher must differentiate well prepared students who didn't understand some moments (teacher must explain simply, easily and comprehensively) and the students who are not ready for practical lessons and want to receive answers to one or another question. In the second case, students must be remembered the method of working with the book. Student's curiosity must be satisfied out of laboratory hours.

III. Then initial level of students' knowledge is assessed by means of a test which includes: classification of drugs, their use in various diseases and pathological conditions and, for obligatory drugs - forms of delivery and prescription.

IV. Test-control using computer program TEST-EDITOR. Students are offered a choice of 15 tests.

V. While watching experimental evidence (virtual films), in other cases (no videos), students are allowed to use the book "the lab guide" or add-on instruction methods for preparing the onself theme. After viewing the experimental work, students must put down conclusions.

The lecturer demonstrates some practical elements of general practice and the sequence of actions. While students work independently, the slot is in the room, supervising their work and giving advice.

As it was mentioned, the independent work should always be corrected and directed by the lecturer. Teacher controls the work of each student, analyzing made mistakes, the report considers the quality of performance, the sequence in solving problems while studying the material independently, the prospectuses and the preparation. Teacher shows how students have mastered the theory of the discipline course.

When the work is accomplished independently, the slot controls written responses. Unprepared student must be in the spotlight during the correction and consolidation of knowledge on the topic. So, the student should be asked several times to include him in the working group and to start to acquire the material himself.

Working independently includes solving 1-2 problems from ,,Methodical indications for Pharmacology laboratory works'', compiling or completion of various tables, charts, drawings, reading slides, problem-solving.

VI. Assessment of student's knowledge of the current theme using an interrogative method. At the beginning, the teacher points out general principles of studying the theme, concrete drugs, the sequence of their study, discussion of their main comparative features of remedies and particularities of their indications. During the discussion of the material it is necessary to take into consideration the use of drugs in different clinical situations: for example, it is necessary to highlight the particular action of preparations in pregnant women, their action on neonates, calculation of the dose of medicine for a child, causes of poisoning in children, measures of prevention and treatment of poisoning.

It is recommended to ask a question, and after a short pause to call out a student. All students should take part in the correction, concretization and formulation of a complete answer. The lecturer must ask the opinion of those who are present.

The division of students into active and passive is not allowed. The lecturer must define the system of questions and the content of practical seminars before their beginning. It is not recommended to start the discussion of the topic with weak students or with the best ones. Better to start the media (the student's curiosity must be satisfied out of laboratory hours). Brilliant students must be asked deeply in order not to let them to get bored.

VII. Generalization of the basic topics of the theme. Lecturer generalizes the key-moments of the subject, carries out the analysis and exposure of the most difficult elements, mistakes and other inaccuracies, which were admitted at the test control.

VIII. The last step is to determine the final level of knowledge of students. For this purpose tests, clinical cases, various situations that reveal the student's complex thinking, accurate claims assessment and logical links consisting of problem situations will be used for level II. Appreciation of students with marks should be based on argued and complete answers.

VII. Suggestions for individual activity:

If you want to acquire good knowledge of pharmacology, follow these pieces of advice:

- Prepare homework which includes: a brief characteristics of obligatory drugs (tablets) writing them out in all medical forms, then select the most effective medical preparations in various specific diseases and pathological conditions. This training model helps to remember the material.
- Read the test from the book "Self tests" and answer to it. This allows you to pass computer test which is hold at each practical seminar.
- Attend lectures and practical seminars in order to learn with the material and to make a proper systematization of the information.

- Do take notes during the lectures and determine if this information represents a continuation of the knowledge acquired at other subjects.
- Organize your time correctly! Discipline of Pharmacology sets high requirements.
- For a better learning, form small groups of 2-3 students. Working in groups forms a better systematization and understanding of the material than individual work. In addition, the ability to explain the learned material to your colleagues will be very useful for you in the future.
- Once you have learned the information on the topic, check yourself using recommended literature: try to repeat without any sources of inspiration. If you manage less, then once again use the phrase " Repetitio est mater studiorum"
- In other words, a student should work independently at least 5-7 hours per week in order to learn pharmacology successfully.

VIII. Methods of assesssment

Knowledge in the discipline of pharmacology is assessed by means of two final and 5 curret test (formative) as follows:

- final test No.1: medical recipes and methods of prescription of drugs in different forms. (Written)

- final test No.2: General Pharmacology. (Written or Oral Test + computer)

current-test No.1 on Neurotrops: Remedies influencing peripheral innervation (Cholinomimetics and anticolinesterase, Cholinoblockers, Adrenomimetics, dopaminomimetics, Adrenoblockers, dopaminoblockers and sympatholitics. Local anesthetics, Medicinal remedies astringent, mucilaginous, adsorbent and irritating.
(Written or oral test + computer).

current-test No. 2 *on "Remedies influencing the CNS system:* Opioid analgesics and non opioids. General anesthetics". .
Ethanol. Hypnotics, anticonvulsants, antiepileptics, anti-Parkinson drugs. Psycholeptics: Antipsychotics. Anxiolitics. Sedatives. Lithium salts.
Psychoanaleptics Antidepressants. Excitants CNS. Nootropes. Analeptics. General tonic and adaptive remedies (Written or oral test + computer).

current-test No. 3 on "Medicinal substances acting on effector function of organs and systems" (drugs acting on respiratory system. Antiarrhythmics. Glycosides and cardiotonics. Vasodilator (antihypertesive) and vasoconstrictor (antihypotensive) medication . Regional and local vasodilator medication. Diuretics. Drugs used in nephrolithiasis, gout and with the influence on acid-base balance. Drugs influencing haemopoiesis, platelet aggregation, blood coagulability and fibrinolysis. Drugs acting on digestive system)
(written + oral test or computerized).

current-test No.4:"Drugs affecting inflammatory, immune and metabolic processes''
(Written or oral test + computer).

current-test No. 5: Antibacterial drugs. Antiparasitic drugs".
(Written or oral test + computer).

Thus, formative evaluation consists of 12 tests, 6 of which are computer tests and 7 written/oral tests. Written/oral tests are assessed with marks from 0 to 10. Computer tests are checked automatically by the program "test editor". Every computer test consists of 20 questions (simple and multiple choice) which are timed with 15 minutes. Students who failed can do the test twice till the next one. If they do the test the week after, they will receive the marks from 0 to 10, the following weeks, students may receive only positive or negative

qualifications. This fact determines the student to pass the totalization in time. The average mark consists of the sum of accumulated points for all written/oral tests during the course of study divided into the number of tests.

Students who do not get positive marks at all written/oral tests, and those who do not work off missed seminars are not admitted to the final exam. The exam in Pharmacology includes American test (Test Editor N.Testemitanu variant) and written/oral tests. The American test consists of 100 tests on all themes of the syllabus in Pharmacology, 40 of which are simple-choice tests and 60 are multiple-choice ones. Students have two academical hours to answer the American test. They are assessed with marks from 0 to 10.

At the oral/written tests each student receives an examination card with questions from Pharmacology syllabus. The structure of the examination card offers students the possibility to show their knowledge of classification, pharmacokinetics, pharmacodynamics, indications, contraindications and side effects of drugs. Prescriptions and indications of drugs in different diseases and pathological conditions, the use of Common International Names of Drugs and management of clinical cases taken into consideration in the assessment of the level of student's knowledge. Students have 30 minutes to get ready for the oral answer. The answer is assessed with marks from 0 to 10. The subjects for the final exam (test, indications, list of obligatory drugs and theoretical questions) are approved at the Methodical Committee on teaching methodical biological disciplines. Students can get acquainted with them a month before the final exam.

The final is calculated on the basis of three components: the oral/written test and the American test. Students are given marks from 0 to 10:

- 10 or ,,excellent'' (ECTS-A) is given for the knowledge of 91-100% of the material
- 9 or ,,very well'' (ECTS-B) is given for the knowledge of 81-90% of the material
- 8 or ,,good'' (ECTS-C) is given for the knowledge of 71-80 % of the material
- 6 and 7 ,,sufficiently" (ECTS-D) is given for the knowledge of 61-65% and 66-70% of the material
- 5 or ,,poor'' (ECTS-E) is given for the knowledge of 51-60% of the material
- 3 or 4 (ECTS-FX) is given for the knowledge of 31-40% and 41-50% of the material respectively
- 1 or 2 or ,, unsatisfactory"(ECTS-F) is given for the knowledge of 0-30% of the material

Failure to appear for the exam without any serious reason is registered with "absent" or zero. Student who failed the examination are entitled to two re-examinations.

Rating Scale

Knowledge of the discipline is assessed with marks from 10 to 1, without decimals. The marks from 5 to 10, obtained as a result of the assessment are considered passing grades, thus the students receive the course credits according to the curriculum. The final mark consists of the total number of current grades and the result of final examination. Students with the average mark below 5 are not admitted to take the final examination.

- Grade 10 or "excellent" is given for the demonstration of profound and remarkable theoretical knowledge and practical skills; considerable knowledge of literature in the field. The student mastered 91-100% of the material included in the syllabus of the course unit.
- Grade 9 or "very good" is given for the demonstration of profound knowledge and good practical skills developed by the student during the course, with some minor,

insignificant errors. The students mastered 81-90% of the course material included in the syllabus of the course unit.

- Grade 8 or “good” is given to the student who can demonstrate good theoretical and practical knowledge gained during the course. The student shows lack of confidence and uncertainty related to the depth and details of the course contents. The student mastered 71-80% of the material included in the syllabus of the course unit.
- Grades 6 and 7 or “satisfactory” are given to students who can demonstrate basic course competences, and can apply the knowledge acquired during the course in simple fundamental situations.
- Grade 5 or “weak” is given to students who can prove minimum competences of the course material, the implementation of which faces numerous difficulties. The student acquired 51-60% of the course material.
- Grades 3 and 4 are given to students who fail to demonstrate the minimum required knowledge of the course contents. The student acquired 31-40% and 41-50% of the course material respectively.
- Grades 1 and 2 are given to students who failed to demonstrate the minimum knowledge requirements of the course contents, or who cheated at their final examination. The student acquired 0-30% of the course material.

Methods of mark rounding

The average of current and final marks	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**

Absence on examination without good reason is recorded as "absent" and is equivalent to 0 (zero). The student has the right to re-take the exam twice.

IX. Language of study

Romanian, Russian, English, French.