Appendix No. 1.5 to the Rector of the University of Rzeszów Resolution No. 7/2023

SYLLABUS

Concerning the cycle of education **2024- 2030**

Academic year 2026/2027

1. BASIC COURSE/MODULE INFORMATION

Course/Module title	**Pharmacology**
Course/Module code *	**Fm**
Faculty (name of the unit offering the field of study)	**Faculty of Medicine, University of Rzeszow**
Name of the unit running the course	**Department of Experimental and Clinical Pharmacology**
Field of study	**Medical**
Qualification level	**Uniform Master studies**
Profile	**General Academic**
Study mode	**Stationary / non-stationary**
Year and semester of studies	**3rd year (6th semester), 4th year (7th semester), 4th year (8th semester)**
Course type	**Obligatory**
Language of instruction	**English**
Coordinator	**Assoc. Prof. Piotr Tutka, MD, PhD**
Course instructor	**Assoc. Prof. Piotr Tutka, MD, PhD** **Karol Wróblewski, PhD in Pharmaceutical Sciences** **Patrycjusz Kołodziejczyk, PhD in Pharmaceutical Sciences** **Bożena Czubat, PhD** **Natalia Pieńkowska**

** - as agreed at the faculty*

1.1. Learning format – number of hours and ECTS credits

Semester (no.)	Lectures	Classes	Colloquia	Lab classes	Seminars	Practical classes	Internships	others	**ECTS credits**
6	15	25							3
7	15	25							3
8	15	25							4
TOTAL	45	75							10

1.2. Course delivery methods

- conducted in a traditional way
- involving distance education methods and techniques

1.3. Course/Module assessment: EXAM

2.PREREQUISITES

Basic knowledge in the field of anatomy, physiology, biochemistry, microbiology, pathology, and first aid. The previous semester of Pharmacology with toxicology have to be passed (applies to 7 and 8 semesters).

3. OBJECTIVES, LEARNING OUTCOMES, COURSE CONTENT, AND INSTRUCTIONAL METHODS

3.1. **Course/Module objectives**

3.2.

C1	Obtaining knowledge by the student about the pharmacological action of drugs, indications, and contraindications to their use, side effects of drugs, and interactions between drugs used in the treatment of various diseases.
C2	The students should know the mechanisms of drug action, clinical effects in the system, interactions, and principles of dosage.
C3	Obtaining knowledge and skills to recognize and respond appropriately in the event of side effects.
C4	Acquiring the ability to properly use sources of information about drugs (databases, scientific publications) and interpret the acquired knowledge.
C5	Obtain basic knowledge about the pharmacotherapy of children, the elderly, pregnant women, and patients with liver and kidney damage and the ability to modify the doses of drugs in these conditions.
C6	Acquisition of facts, concepts, and principles of rational pharmacotherapy in clinical practice.
C7	The student should be able to prescribe ready-made medications and recipe forms of drugs on the prescription
C8	Obtain knowledge of the principles and treatment of life-threatening conditions.
C9	The student should be able to understand the basic concepts of general toxicology and learning the mechanism of action of various toxic agents.
C10	Gaining the ability to assess toxicological safety and interpret the results of toxicological tests.
C11	Acquiring the ability to diagnose acute poisoning and implement basic treatment procedures.

3.2. **Course/Module Learning Outcomes**

EK (the effect of education)	The content of learning outcomes defined for the course (module)	Reference to directional effects [1]
EK_ 01	Knows and understands the different groups of medicinal products, their mechanisms and effects of action, principal indications and contra-indications, and basic pharmacokinetic and pharmacodynamic parameters;	C.W28.
EK_ 02	Knows and understands the physiological and pathological conditions of absorption, metabolism and elimination of drugs by the human body	C.W29.
EK_03	Knows and understands the basic principles of pharmacotherapy, considering its efficacy and safety, the necessity to individualise treatment, including that deriving from pharmacogenetics	C.W30.
EK_04	Knows and understands the major adverse effects of drugs, interactions and the problem of polypragmasia	C.W31.
EK_05	Knows and understands the problem of drug resistance, including multidrug resistance, and the principles of rational antibiotic therapy	C.W32.
EK_06	Knows and understands the possibilities and types of biological, cellular, gene and targeted therapies for specific diseases;	C.W33.
EK_07	Makes the simple pharmacokinetic calculations	C.U8.
EK_08	Selects drug in the correct dosage for the correction of pathological phenomena in the human body and in individual organs	C.U9.
EK_09	Designs a scheme of rational chemotherapy of infections and knows the principles of the empirical and targeted therapies.	C.U10.

[1] *In the case of a path of education leading to obtaining teaching qualifications, also take into account the learning outcomes of the standards of education preparing for the teaching profession.*

EK_10	Prepares prescription forms of selected medicinal substances and issue prescriptions, including e-prescriptions, in accordance with legislation	C.U11.
EK_11	Search for reliable information on medicinal products, with particular attention to the summary of product characteristics (SmPC) and databases	C.U12.
EK_12	Estimates a toxicological risk for certain age groups and of hepatic and renal failure; knows of principles the preventing medicine poisoning	C.U13.
EK_13	Is ready to recognise and acknowledge his/her own limitations, make self-assessments of deficits and learning needs	K.05
EK_14	Is ready to use objective sources of information	K.07
EK_15	Is ready to draw conclusions from his/her own measurements or observations	K.08
EK_16	Is ready to accept the responsibility associated with decisions taken in the course of professional activities, including in terms of his/her own safety and that of others	K.11
EK_17	Is ready to promote healthy behaviour	K.12

3.3. Course content

7th semester

A. Problems of the lecture

Course contents	Hours
1. Autonomic system drugs (part I)	1
2. Autonomic system drugs (part I)	1
3. Drugs affecting kidney function. Diuretics.	1
4. Antihypertensive drugs. Management of hypertension and hypertensive emergencies.	1
5. Antianginal drugs. Management of acute coronary syndromes..	1
6. Treatment of heart failure.	1
7. Antiarrhythmic drugs. Management of supraventricular and ventricular arrhythmias	1
8. Hormones and drugs affecting hypothalamus and pituitary gland.	1

9. Thyroid gland hormones. Treatment of hypothyroidism and hyperthyroidism.	1
10. Adrenal steroids and related drugs.	1
11. Insulin. Management of diabetes mellitus type 1.	1
12. Oral hypoglycemic drugs. Management of diabetes mellitus type 2. Treatment of obesity.	1
13. Estrogens. Progestins. Androgens. Drugs affecting fertility and reproduction (part I).	1
14. Estrogens. Progestins. Androgens. Drugs affecting fertility and reproduction (part II).	1
15. Hormones and drugs affecting calcium/phosphate balance and bone metabolism. Treatment and prophylaxis of osteoporosis.	1

B. Problems of classes

Course contents	**Hours**
1. Drugs affecting cholinergic system (part I): cholinomimietics.	1
2. Drugs affecting cholinergic system (part II): cholinolytics.	1
3. Catecholamines. Drugs affecting adrenergic system indirectly.	1
4. Drugs affecting α-adrenergic system	1
5. β-adrenomimetyc drugs.	1
6. β-adrenolytic drugs	1
7. Drugs affecting kidney function (diuretics, vasopressin analogues).	1
8. Angiotensin converting enzyme inhibitors and angiotensin receptor antagonists.	1
9. Drugs used in the treatment of heart failure.	1
10. Management of hypertension and hypertensive emergencies.	1
11. Antihypertensive drugs.	1
12. Drugs used in sudden cardiac arrest and cardiovascular emergencies (including cardiogenic shock).	1
13. Drugs used in the treatment of peripheral vascular disorders.	1
14. Antianginal drugs.	1
15. Management of myocardial infarction and other acute coronary syndromes.	1
16. Antiarrhythmic drugs.	1
17. Test nr 1 (classes 1-16 material).	1
18. Hormones and drugs affecting hypothalamus and pituitary gland	1
19. Thyroid gland hormones. Drugs used in the treatment of thyroid disorders.	1
20. Adrenal steroids and their synthetic analogues. Inhibitors of adrenal steroids synthesis a and action (part I)	1
21. Adrenal steroids and their synthetic analogues. Inhibitors of adrenal steroids synthesis a and action (part II).	1
22. Insulin.	1
23. Oral antidiabetic drugs	1
24. Management of diabetes mellitus type 1 and 2. Other drugs affecting carbohydrate metabolism and appetite.	1
25. Estrogens. Progestins. Hormonal contraceptive drugs.	1

26. Other drugs affecting fertility and reproduction.	1
27. Androgens.	1
28. Hormones and drugs affecting calcium/phosphate balance and bone metabolism. Treatment and prophylaxis of osteoporosis.	1
29. Progress in pharmacotherapy.	1
30. Test nr 2 (classes 18-28 material).	1

8th semester

A. Problems of the lecture

Course contents	Hours
1. Drugs used for the treatment of respiratory tract diseases. Management of bronchial asthma and bronchospastic conditions.	1
2. Gastrointestinal drugs.	1
3. Drugs used for the treatment of anemias.	1
4. Drugs used in blood coagulation disorders	1
5. Drugs affecting the Central Nervous System. Neurotransmitters and receptors.	1
6. Local and general anaesthetic drugs.	1
7. Benzodiazapines and other anxiolytic drugs. Hypnotic drugs. Sedative drugs.	1
8. Antipsychotic drugs (neuroleptics).	1
9. Antidepressant and mood-stabilizing drugs.	1
10. Antiepileptic drugs.	1
11. Drugs used to treat neurodegenerative diseases.	1
12. Management of pain. Analgesic drugs. Opioids analgesics and antagonists.	1
13. Non-steroidal antiinflammatory drugs. Antipyretic drugs.	1
14. Drugs used in ophtalmology.	1
15. Vitamins. Trace elements.	1

B. Problems of classes

Course contents	Hours
1. Drugs used for the treatment of respiratory tract diseases bronchodilatators, antitussive drugs, expectorants, mucolytics, antiinflammatory drug, chemoterapeutics used for the treatment of respiratory tract infections). Management of bronchial asthma and bronchospastic conditions.	2
2. Gastrointestinal drugs (antiemetic drugs, drugs affecting gastrointestinal motility, antidiarheals drugs, laxative drugs, drugs used for the treatment of gastrointestinal infections). Management of GERD and peptic ulcer disease. Management of *Helicobacter pylori* infections. Management of inflammatory bowel disease. Drugs used for the treatment of liver and pancreas diseases.	2

3. Hematopoietic agents (growth factors, minerals, vitamins). Blood. Blood substitutes and products. Drugs used for the treatment of anemias. Antithrombotic drugs. Fibrinolytic drugs. Antiplatelet drugs.	2
4. Central neurotransmitters. Neuropeptides. Local and general anaesthetic drugs. Surgical anesthesia. Neuromuscular pharmacology.	2
5. Sedative drugs. Anxiolytics drugs. Hypnotic drugs.	2
6. Antipsychotic drugs (neuroleptics drugs).	2
7. Antidepressant drugs. Management of affective disorders. Mood-stabilizing drugs. **Test I (labs 1-6).**	2
8. Antiepileptic drugs. Management of epilepsies. Drugs used to treat neurodegenerative diseases (antiparkinsonian drugs, drugs ued for the treatment of Alzheimer disease, Huntington disease and amyotrophic lateral sclerosis).	2
9. Management of pain. Opioids analgesics and antagonists.	2
10. Other analgesic drugs. Eicosanoids. Non-steroidal antiinflammatory drugs. Antipyretic drugs. Drugs used for treatment of diathesis urica. Management of arthritis rheumatoidea.	2
11. Vitamins. Trace elements.	2
12. Drugs used in ophtalmology. **Test II (labs 7-11)**	2
13. Progress in pharmacology and pharmacotherapy.	2
14. Repetition of recipes.	2
15. Repetition of term 8 material. Practical exam: recipe (3 terms material)	2

3.4. Methods of Instruction

Lecture: lecture with a multimedia presentation using Office 365

Classes: Group work (solving tasks and clinical problems). Discussion. Analysis of clinical cases. Planning of experiments. Performing Experiments. Formulating and analyzing research problems. Database searching. Preparation of multimedia presentation. Participation in research grant.

4. ASSESSMENT TECHNIQUES AND CRITERIA

4.1 Methods of verification of learning outcomes

Symbol of effect	Methods of assessment of learning outcomes (eg.: tests, oral exams, written exams, project reports, observations during classes)	Form of classes
EK_ 01	oral/written answer, final test	lecture, exercises
EK_ 02	oral/written answer, final test	lecture, exercises
EK_03	oral/written answer, final test	lecture, exercises
EK_04	oral/written answer, final test	lecture, exercises

EK_05	oral/written answer, final test	lecture, exercises
EK_06	oral/written answer, final test	lecture, exercises
EK_07	the written answer, final test	lecture, exercises
EK_08	oral/written answer, final test	lecture
EK_09	the written answer, final test	lecture, exercises
EK_10	oral/written answer, practical exam	lecture, exercises
EK_11	oral/written answer, practical exam	lecture, exercises
EK_12	oral/written answer, final test	Lecture/exercises
EK_13	oral/written answer, final test	lecture, exercises
EK_14	oral/written answer, practical exam	exercises
EK_15	oral/written answer,	exercises
EK_16	the oral answer	exercises
EK_17	oral/written answer, multimedia presentation, practical exam, final test	lecture/exercises

4.2. Course assessment criteria

The pharmacology course includes 45 hours of lectures and 75 hours of classes during three semesters: 6, 7, 8. The course ends in the recipe practical exam and the final test exam.
The lectures and classes are mandatory. Students are obliged to be familiar with the issues covered by the lecture held during the respective week and with the material to be discussed during classes according to the topic schedule. The student who is absent at the lecture is obliged to pass the respective material orally.

Conditions for completing the pharmacology course:

- presence at all classes and lectures

- demonstrating knowledge and skills at least on a satisfactory level in the obligatory program material in each of the three semesters (see content), i.e. completion of three semesters

- linking the pharmacological knowledge with its application for the patient contact.

- obtaining at least satisfactory (3.0) final grade

Conditions for completing the semester:

The requirement for passing each semester is the presence at all classes and lectures, obtaining at least a satisfactory final grade from the exercises, and passing a test on the recipe.

The grade from completing the semester will be the result of all learning outcomes, i.e. the student's knowledge, skills, and social competencies. The scoring rules are contained in the internal regulations. Scoring will include oral answers, written tests (e.g. a prescription test), control tests (minimum two per semester), activity assessment (assessment of competencies and attitudes). The final grade in each semester will depend on the number of points obtained by the student. Obtaining the minimum number of points is a requirement for passing the course, and joining the next semester, and the final exam. Students who do not achieve the

required minimum number of points will not be able to take the 8th semester and final exam and will have to pass the entire material in the form of a test.

Detailed evaluation criteria:

The final grade for the classes will be determined based on the points obtained by the student.

The student can obtain max. 16 points in each semester based on:

a. points from 2 partial tests (maximum 10 points)

The final grade for the classes will be determined based on the points obtained by the student, which include:

a. points from 2 partial tests (maximum 10 points)

Each part of the pharmacology course ends in the control test (two tests during each semester). The test consists of 25 questions. Each test can be awarded a maximum of 5 points. Tests will be performed on the one established date only. These is not possible to correct the test grade or write the test on another term due to absence. In the case of an excused absence (hospitalization etc.), the student will have the opportunity to pass the material. The term to pass the material and its form will be determined by the teacher leading the group.

Each test will be estimated based on as follows:

0-8 correct answers – „-2" (minus two) points

9-12 correct answers – 0 points

13 correct answers – 1 point

14 correct answers – 2 points

15-16 correct answers – 3 points

17-18 correct answers – 3,5 points

19-20 correct answers – 4 points

21-22 correct answers – 4,5 points

23-25 correct answers – 5 points

Attention! The unexcused absence during the test leads to obtain minus two points (- 2 points).

b. points from an oral or written answer (maximum 4 points)

The student should know the current material and with the previous class. This knowledge can be verified orally or in writing (the form is decided by the teacher). The student may answer orally or in writing at least 2 times (or more). The grade scale for oral / written responses is 0, 1, 1.5, 2, 2.5, 3, 3.5 and 4 points. The final number of answer points will be the average of the points

obtained from all the answers in the semester. A student may be unprepared for classes once a semester, but he must inform the teacher about it before starting the classes. If the student is prepared for all the classes, he/she will receive an additional 0.5 points at the end of the semester.

c. points for activity (competence and attitude) during classes (maximum 1 point)

The student's activity during the whole course (e.g. participation in discussions, brilliant answers, general attitude) will be assessed according to a scale of 0, 0.5, and 1 point. The student can prepare a multimedia presentation (mini-lecture lasting 10-12 minutes) with the subject agreed with the teacher. The presentation should be prepared in PowerPoint (PTT format) and sent to the following address: farmakologia@ur.edu.pl at least 3 days before its show date during the classes. The file should contain in the title: the title of the presentation, surname and first name, group number, and surname of the tutor. The student may receive 0.5 points for preparing the presentation. A maximum of 2 presentations can be shown during one exercise.
The minimum of points required to pass the semester is 8.5 points.

Each semester will be estimated based on the following score:
8.5-9.5 points – 3.0
10.0-11.0 points – 3.5
11,5-12,5 points – 4,0
13,0-13,5 points – 4,5
14,0-16 points – 5

Students who fail 8.5 points, fail the first term and semester. They haveto pass all the material in the form of a test, from which they must obtain at least 60% correct answers. The date of the test will be determined by the Head of Department after consultation with the students.

A student who did not obtain the required 8.5 points in the first term but passed the test later will receive 3.0 (satisfactory) as the final grade for the exercises. In the described situation, the number of points from the semester necessary to give the final grade for the subject will be calculated as (2.0 + 3.0)/2. If the student does not achieve 8.5 points in the classes and fails the retake in the first term, he/she will receive an unsatisfactory grade (2.0) in the first examination

period. Then it is necessary to pass the semester in the re-sit session on the date and the form determined by the Head of Department.

Practical exam: recipe

After the end of the 8th semester, the skill of prescribing the prescription drugs and the selection of drugs for various diseases will be examined. A practical exam will consist of writing 10 prescriptions. Each prescription will be scored as follows: 0, 0.5 or 1 point. The practical exam will be passed if the student reaches at least 7.5 points. Unexcused absence from the exam will result in failure to pass the exam. Failure to pass on the first date requires to pass in new term established by the Head of the Department. Passing the practical exam is a necessary condition for taking the final test exam.

Final test exam

The final exam will be carried out after the 8th semesters. The student can pass the final exam after he/she has obtained the positive pass of all semesters (6, 7, and 8th semester). The final exam will be passed in the test form and it will be covered issues lectures, exercises, and self-cultivation. The test contains 100 single-choice questions (five possible answers and only one of them is correct) and takes approx. 100 minutes since the start of the writing test. Students can obtain one point for each correct answer. To pass the final exam, the required score is 60% of correctly answered questions out of the total number of 100 questions.

If the total grade of Student is in range of 4.25-4.5 from three semesters, the student earns a 5% points bonus at the final exam. If the total score from three semesters is higher than 4.5 points, the student earns an 8% points bonus at the final exam. Attention: the bonus points are added to the final exam score only if the final exam is passed (at least 60% of correct answers).

The exam will be estimated based on the following score:

0-60 correct answers – failed (2.0)
60-68 correct answers – passed (3.0)
69-76 correct answers – passed (3.5)
77-84 correct answers – passed (4.0)
85-92 correct answers – passed (4.5)
93-100 correct answers – passed (5.0)

Unexcuse absence from the exam results in a 2.0. Absence from the examination may be excused and the student can pass the exam in a re-sit exam session. It will be marked as the first time of the exam. The retake exam will be prepared in a test form.

Final pharmacology score

The final grade for the course is the average of grades obtained based on 3 semesters (see above) and the grade of the final exam. The average marks of the 3 semesters will be 40%, and the grade obtained from the final exam will be 60% of the final grade of course. In the case of the average of 3.25, 3.75, 4.25, and 4.75, the final grade is determined by the result of the final exam. A student who fails any of the 3 semesters and/or does not receive at least a satisfactory grade in the final exam will not receive credit for the course (unsatisfactory grade).

Criteria of the final grade:

5.0 –knows of each of the contents of education at the level of 93% -100%

4.5 – knows of each of the contents of education at the level of 85%-92%

4.0 – knows of each of the contents of education at the level of 77%-84%

3.5 – knows of each of the contents of education at the level of 69%-76%

3.0 – knows of each of the contents of education at the level of 60%-68%

2.0 – KNOWS OF EACH OF THE CONTENTS OF EDUCATION BELOW 60%

5. TOTAL STUDENT WORKLOAD NEEDED TO ACHIEVE THE INTENDED LEARNING OUTCOMES – NUMBER OF HOURS AND ECTS CREDITS

Activity	The average number of hours to complete the activity
Contact hours (with the teacher) resulting from the study schedule of classes	40 (6th semester) + 40 (7th semester) + 40 (8th semester)
Contact hours (with the teacher) participation in the consultations, exams	1 (6th semester) + 1 (7th semester) + 4 (8th semester)
Non-contact hours - student's work (preparation for classes, exam, writing a paper, etc.)	59 (6th semester) + 79 (7th semester) + 47 (8th semester)
SUM OF HOURS	311
TOTAL NUMBER OF ECTS	**10**

** It should be taken into account that 1 ECTS point corresponds to 25-30 hours of total student workload.*

6. TRAINING PRACTICES IN THE SUBJECT

NUMBER OF HOURS	-
RULES AND FORMS OF APPRENTICESHIP	-

7. LITERATURE

The obligatory books:

1. James M. Ritter, Rod J. Flower, Graeme Henderson, Yoon Kong Loke, David MacEwan, Humphrey P. Rang. Rang & Dale's Pharmacology, 2021.
2. Craig W. Stevens, George M. Brenner. Brenner and Stevens' Pharmacology, 2022

Recommended literature:

1. Anthony J. Trevor, Bertram G. Katzung. Basic and Clinical Pharmacology, 2017
2. Laurence L. Brunton, Björn C. Knollmann, Randa Hilal-Dandan. Goodman and Gilman's The Pharmacological Basis of Therapeutics, 2017
3. Karen Whalen. Lippincott Illustrated Reviews: Pharmacology. 2018

and other academic books indicated by teachers

1 Acceptance Unit Manager or authorized person