AL-FARABI KAZAKH NATIONAL UNIVERSITY
Faculty of Medicine and Healthcare
Higher School of Medicine
Department of Fundamental Medicine

AFFIRM
Dean of the Faculty
_____(signature)
Kalmatayeva Z.A.
"____" _____ 2022

EDUCATIONAL AND METHODICAL COMPLEX OF DISCIPLINE
MZiB2216 «Mechanisms of Defense and Disease»

B086 General medicine

Educational program «General medicine»

Course – 2
Semester – 4
Credits number – 10

Almaty 2022

Educational and methodical complex of discipline was compiled by Doctor of Biology Science, associate professor Jumasheva Rakhima, PhD Tamila Akhayeva, Candidate of Medical Sciences Aida Seitaliyeva, Master of Medical Sciences Akbota Targynova.

Based on the curriculum for the educational program B086 General medicine

Considered and recommended at a meeting of the department of fundamental medicine
from "___" _____ 202_, protocol No.__

Head of the department _____ Sarsenova L.K.

Recommended by the methodological council of the Higher School of Medicine
"____"_____ 202_, protocol No. ___

Chairman of the methodological council of the Higher School of Medicine _____ Dzhumasheva R.T.

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SYLLABUS

Spring semester, 2021-2022 academic year

Academic course information

Discipline's code	**Discipline's title**	**Type**	**No. of hours per week**			**Number of credits**	**ECTS**
			Lecture	Practical	Lab.		
MZiB2216	Mechanisms of Defense and Disease	BD UC	5	5	0	10	10
Teacher of Medical Genetics	Akbota Targynova, MSc, PhD candidate			**Office hours**	According to the schedule		
e-mail	targynova.akbota@med-kaznu.com						
Phone number	87011508580			**Auditorium**	According to the schedule		
Teacher of Medical Genetics	Zhansaya Assil			**Office hours**	According to the schedule		
e-mail	zhansaya.assil@med-kaznu.com						
Phone number	87471642204			**Auditorium**	According to the schedule		
Teacher of Pharmacology	Tamila Akhayeva, PhD			**Office hours**	According to the schedule		
e-mail	akhayeva.tamila@med-kaznu.com						
Phone number	87773060445			**Auditorium**	According to the schedule		
Teacher of Pharmacology	Aida Seitaliyeva, candidate of medical sciences			**Office hours**			
e-mail	seitaliyeva.aida@med-kaznu.com						
Phone number	87002246495			**Auditorium**	According to the schedule		
Teacher of Microbiology	Moldir Sharipova			**Office hours**	According to the schedule		
e-mail	sharipova.moldir@med-kaznu.com						
Phone number	87762009201			**Auditorium**	According to the schedule		

Teacher of Microbiology	Karlygash Zhaparkulova, PhD		**Office hours**	According to the schedule		
e-mail	zhaparkulovakarlygash@mail.ru					
Phone number	87017983139		**Auditorium**	According to the schedule		

Academic presentation of the course	**Course type**: core discipline of university component of module **Biomedicine essentials**. The discipline considers the integration of the body's defense mechanisms in the development of pathological processes from the point of view of medical genetics, infectious microbiology and pharmacology. **The aim of the course**: detection pathogenesis of genetically determined and hereditary diseases; understanding of population genetics; the role of microorganisms in human infectious pathology, the use of microbiological methods in the diagnosis of diseases; the foundations of rational use of drugs for various types of pathology. **Learning outcomes of discipline.** After completing this course students will be able to: 1. apply knowledge about molecular and genetic aspects of genetically determined diseases (chromosomal, monogenic, polygenic); understand the principles of genetic diagnostics and medical genetic counseling. 2. apply knowledge of molecular-genetic, biochemical mechanisms of the body's response to drugs and biologically active compounds. 3. understand the biochemical processes in the main pathological conditions and genetically determined diseases. 4. apply knowledge of the infectious process and its features in various types of human pathogens, apply knowledge of immunodiagnostics of infectious diseases, apply knowledge of immunoprophylaxis, demonstrate an understanding of the principles of infection control and biosafety 5. interpret the results of specific molecular genetic diagnostic methods 6. understand the role of relevant risk factors of diseases for decision-making with a view to their prevention. 7. integrate knowledge on human genetics, immune response, biochemical processes and the interaction of micro and macro-organism for the purposes of diagnosis and personalized treatment of human pathology 8. know the pharmacokinetic parameters, mechanisms of absorption and biotransformation of drugs. 9. apply knowledge of pharmacodynamics and mechanisms of action of drugs in the main pathological processes (affecting the acid-base state, hemostasis and hematopoiesis, inflammation, infectious process, allergies, autoimmunity, onco-process). Know the types of undesirable side reactions and understand the possibilities of their correction. 10. demonstrate the ability to identify learning gaps and create strategies to enhance one’s own knowledge and skills. 11. effectively communicate with other students and teachers regarding medical and scientific information, articulate their opinions clearly when discussing and work effectively as a member of the team
Prerequisites	MZiZ2215 Mechanisms of Defense and Health

Postrequisites	PRS3205, PSSS3206, PPS3207, PMS3208, PES3209 Pathology of organs and systems
Information resources	**Basic literature**: 1. Thompson & Thompson genetics in medicine (2016) Robert L. Nussbaum, Roderick R. McInnes, Huntington F. Willard, Ada Hamosh. Philadelphia, PA: Elsevier 2. Basic & Clinical Pharmacology [Electronic resource]: collection / ed.: B. G. Katzung, A. J. Trevor. - 13th ed. - New York; Chicago; San Francisco: McGraw-Hill Education, 2015. - 1837 p. - ISBN 978-0-07-182641-9: 0.00 3. Jawetz, Melnick & Adelberg's Medical microbiology. Geo F. Brooks, Karen C. Carroll, Janet S. Butel, Stephen A. Morse, Timothy A. Mietzner. 26th edition, 2013 **Additional literature:** 1. Jorde, L.B. et al. (2016) Medical Genetics. Philadelphia, PA: Elsevier 2. Emery's Elements of Medical Genetics (2017) Turnpenny, P.D., Ellard S. 15th Edition, Elsevier 3. Hartwell, L. et al (2017) Genetics: from genes to genomes, 6th edition. New York, NY: McGrawHill Education 4. USMLE Step 1 Lecture Notes (2017): Biochemistry and Medical Genetics. Kaplan Publishing **WWW resources:** 1. OMIM® Online Mendelian Inheritance in Man® An Online Catalog of Human Genes and Genetic Disorders https://www.omim.org/ 2. The Genetic Testing Registry (GTR®) https://www.ncbi.nlm.nih.gov/gtr/ 3. Genetics Home Reference. https://ghr.nlm.nih.gov/resources 4. ClinGen: Clinical Genome Resource https://www.clinicalgenome.org/ 5. Learn.Genetics https://learn.genetics.utah.edu/content/basics/ 6. Clinical Genetic Education Resources (Courses and Lectures) https://www.kumc.edu/gec/prof/genecour.html 7. Genomics Education Program. https://www.genomicseducation.hee.nhs.uk 8. ELSEVIER "Clinical learning" training program, 2018 9. Computer program "Diamorph" - "Medical Microbiology" - atlas-guide to the bacteriology of mycology, protozoology and virology edited by Acad. Prof. Vorobyova A.A. 10. https://www.msdmanuals.com/professional/clinical-pharmacology
Academic policy of the course in the context of university moral and ethical values	CLASSES ATTENDANCE Students of Al-Farabi Kazakh National University must attend all types of academic sessions in accordance with the approved schedule. It is not allowed to miss classes without an acceptable reason, proved by suitable documents. Students of Al-Farabi Kazakh National University must attend all types of academic sessions in accordance with the approved schedule. It is not allowed to miss classes without an acceptable reason, proved by suitable documents. Students who have missed classes without a valid reason for more than 5 weeks are subject to expulsion from the university for violating the rules of the university's academic policy. Students who do not attend training sessions for more than 5 weeks due to illness must inform their

	advisor and instruct a trusted person to issue an academic leave for health reasons. If a student misses more than 50% of study sessions on a discipline, he/she is automatically graded "F" ("unsatisfactory") and is not allowed to the final assessment on the discipline. ASSESSMENT OF EDUCATIONAL ACHIEVEMENTS OF STUDENTS To assess educational achievements of students (achievement of expected learning outcomes), there are following types of control of students' academic performance: – ongoing assessment; – interim examination (RK1,RK2); – midterm examination (MT); – final assessment (final exam). Grade points of the interim examination reflect cumulative total assessment of current academic performance of the student (according to the grades indicated in the attendance list) and results of performance of special tasks of interim examination. The maximum level of academic performance for interim and midterm examinations on the discipline is 100 grade points for each interim examination and for midterm examination, including the results of ongoing assessment. Students who have scored at least 50 grade points (IE1 + MT + IE2 / 3) are admitted to the final assessment of their academic performance. The maximum grade for the final exam is 100 grade points. Admission to the examination session is issued by order of the dean of the faculty. It is not allowed to change the results of interim and midterm examinations to increase them. To the final examination are not admitted: – students who scored less than 50 points based on the results of interim examinations and MT (IE1 + MT + IE2 / 3); – students who missed more than 50% of classes on the discipline, regardless of documentary evidence; – students who have not submitted term papers (projects) on the relevant discipline; – students studying on contractual basis for provision of educational services, who have debts in payment of tuition fees. ASSESSMENT OF LEARNING OUTCOMES, APPEAL, RETAKING OF EXAMS Academic achievements of students (knowledge, abilities, skills and competencies) are assessed using the 100-point scale in grade points, corresponding to the internationally accepted alphabetic system with digital equivalents (positive grades, in decreasing order, from "A" to "D" (100-50), and “unsatisfactory” - “FX” (25-49), “F” (0-24), and to the grades of the traditional system. “FX” grade is used only for final examinations. The student, who does not agree with the result of the final assessment on the discipline (grade for the exam), has the right to submit a reasoned written application within three working days after the exam results are published in the electronic records sheet in the Univer system. Application for appeal is accepted, if the grade for the exam does not correspond to the objective level of learning outcomes demonstrated by this student: – due to the incorrect wording of the examination question; – due to the fact that the examination question’s content does not correspond to the study program of the discipline; – due to the fact that the student’s response was assessed incorrectly because of the lack of qualification of the members of examination committee. Appealed grade and reason for the appeal should be stated in the student’s application. In the case of receiving the “unsatisfactory” grade corresponding to the “FX” mark (25-49), the student has the opportunity to retake the final assessment on a paid basis without repeated study of the whole program of the discipline / module. This should be done within the special period

	of time right after the examination session during which this grade was obtained. If the student gets the "F" grade as a result of re-taking the final exam, he/she should re-register for study of this discipline / module on a paid basis. He/she attends all study sessions, performs all types of academic activities according to the program of the discipline and retakes the final exam. If the student does not appear for a re-taking exam on the discipline for which he/she has been graded "FX", this grade will be transferred to the "F" ("unsatisfactory") and considered an academic debt. Then the student should attend in the next semester on a paid basis all types of study sessions, perform all types of academic work on this discipline according to the program, and take the final exam. Retaking the exam with an "FX" grade is allowed only once. A student, who violates requirements of the Rules for conducting final assessment (that is using permitted supporting aids, mobile phones, being late for the exam without an acceptable reason, etc.), will get the "F" grade automatically, based on the record of violation, which is not subject to complain and appeal. In this case, the student should re-study this discipline on a paid basis. In the case of getting the "F" grade, the student has the right to repeat studying the discipline (Retake), but no more than two times. Repeated study of disciplines is carried out only on a paid basis. THE CODE OF PROFESSIONAL CONDUCT OF STUDENTS OF THE HIGHER SCHOOL OF MEDICINE OF THE FACULTY OF MEDICINE AND HEALTHCARE OF KAZNU, THE CODE OF HONOR OF KAZNU, THE REGULATIONS ON THE STUDENT OF KAZNU A student of KazNU strictly fulfills his academic duties, does not allow ethical, academic and legal violations, including: plagiarism; forgery; use of cheat sheets, cheating and hints at all stages of various forms of knowledge control; use of family or official ties to obtain a higher grades; bribery; cheating of a teacher and disrespectful attitude towards him; absenteeism and tardiness without a valid reason. A student of KazNU takes care of the safety of the property of KazNU and suppresses vandalism on its territory. In case of illegal actions, appropriate disciplinary penalties will be applied.
Evaluation and attestation policy	**Criteria-based evaluation:** evaluation of learning outcomes in accordance with the descriptors, verification of the formation of competencies (learning outcomes specified in the goal) is carried out by the following methods: **Testing** (open and closed questions) with situational tasks, diagrams, microphotographs) - current / interim, midterm / final control: learning outcomes № 1-9 **Written / oral quiz** - current / interim, midterm / final control: learning outcomes № 1-10 **Group Problem solving (cases**) - current control: learning outcomes № 1-11 **Direct observation** - current control /SIW: learning outcome № 11 **Summative evaluation:** 1. The course is planned to hold 3 controls (2 interim, 1 midterm examination) in each discipline: medical genetics, microbiology and pharmacology. 2. For the semester, admission to the final exam rating points: AR = (IE1 + MT (mid-term) + IE2) / 3, where IE1 / IE2 / MT = the sum of all points for classes + points for interim/midterm and IWS of the corresponding period*.

	3. IE1 - 1-5 weeks, MT- 6-10 weeks, IE2 - 11-15 weeks. The final control (exam) is carried out by written examination. The final grade for the discipline = AR * 0.6 + Exam * 0.4 *AR – admission rating, IE – interim examination, MT – midterm examination, IWS – independent work of students

Calendar (schedule) the implementation of the course content:

Week	Lesson	Topic name (lectures, practical classes, independent work of students with a teacher)	Hours	Max. score
I. MEDICAL GENETICS				
1-2	1-2	**Lecture** Introduction to Medical Genetics. Chromosomal disorders	2	
		Practical lesson Introduction to Medical Genetics. Chromosomal disorders	4	6
3	3	**Lecture** Sex Chromosome disorders.	1	
		Practical lesson Sex Chromosome disorders.	2	3
4	4	**Lecture** Mendelian classic disorders: autosomal inheritance	1	
		Practical lesson Mendelian classic disorders: autosomal inheritance	1	
		Colloquium 1 “Chromosomal disorders”	1	19
5	5	**Lecture** Mendelian classic disorders: autosomal inheritance	1	
		Practical lesson Mendelian classic disorders: autosomal inheritance	2	3
		IWST: consultation for the implementation of the IWS	2	
		Interim examination 1		**31**
6	6	**Lecture** Mendelian classic disorders: sex-linked inheritance	1	
		Practical lesson Mendelian classic disorders: sex-linked inheritance	2	3
		IWST: consultation for the implementation of the IWS	2	
7-8	7-8	**Lecture** Non-mendelian genetic disorders	2	
		Practical lesson Non-mendelian genetic disorders	4	6
		IWST: consultation for the implementation of the IWS	2	

9	9	**Lecture** Fundamentals of population genetics	1	
		Practical lesson Fundamentals of population genetics	1	
		Colloquium 2 "Mendelian and non-mendelian genetic disorders."	1	19
10	10	**Lecture** Fundamentals of population genetics	1	
		Practical lesson Fundamentals of population genetics	2	3
		Midterm examination		**31**
11-12	11-12	**Lecture** Polygenic multifactorial disorders	2	
		Practical lesson Polygenic multifactorial disorders	4	6
		IWST: consultation for the implementation of the IWS	2	
13	13	**Lecture** Cancer Genetics and Genomics	1	
		Practical lesson Cancer Genetics and Genomics	2	3
		IWST: consultation for the implementation of the IWS	2	
14	14	**Lecture** Polygenic disorders: developmental malformation	1	
		Practical lesson Polygenic disorders: developmental malformation	2	3
		IWST: delivery of IWS **1.** Essay on the arguments surrounding the ethical dilemma in medical genetics **2.** Mind map "Classification of hereditary diseases"	5	4
15	15	**Lecture** Polygenic disorders: developmental malformation	1	
		Colloquium 3 "Population genetics. Cancer Genetics and Genomics. Polygenic multifactorial disorders"	2	15
		Interim examination 2		**31**
II. MEDICAL MICROBIOLOGY				

1	1	**Lecture** Gram-positive cocci. Microbiological diagnostics. Filling the staphylococcal infection research algorithm. The rules for the collection and delivery of material for infectious and somatic diseases caused by gram-positive cocci. Principles of treatment and prevention. Gram-negative cocci. Microbiological diagnostics. Filling the research algorithm for meningococcal infection. The rules for the collection and delivery of material for infectious and somatic diseases caused by gram-negative cocci. Principles of treatment and prevention.	2	
	2	**Practical lesson** Gram-positive cocci. Microbiological diagnostics. Filling the staphylococcal infection research algorithm. The rules for the collection and delivery of material for infectious and somatic diseases caused by gram-positive cocci. Principles of treatment and prevention. Gram-negative cocci. Microbiological diagnostics. Filling the research algorithm for meningococcal infection. The rules for the collection and delivery of material for infectious and somatic diseases caused by gram-negative cocci. Principles of treatment and prevention.	1	3
2	3	**Lecture** Isolation of a pure culture of enterobacteria (1-4 days of the study). Escherichia. Shigella. Vibrios. Diseases caused. Features of microbiological diagnosis in connection with the pathogenesis of diseases. Principles of treatment, prevention.	2	
	4	**Practical lesson** Isolation of a pure culture of enterobacteria (1-4 days of the study). Escherichia. Shigella. Vibrios. Diseases caused. Features of microbiological diagnosis in connection with the pathogenesis of diseases. Principles of treatment, prevention.	1	3
3	5	**Lecture** Salmonella. Features of microbiological diagnosis in connection with the pathogenesis of caused diseases. Principles of treatment, prevention. Differential diagnosis of bacteria of the intestinal group. Campylobacter. Helicobacter. Features of microbiological diagnosis in connection with the pathogenesis of diseases. Principles of treatment, prevention.	2	
	6	**Practical lesson** Salmonella. Features of microbiological diagnosis in connection with the pathogenesis of caused diseases. Principles of treatment, prevention. Differential diagnosis of bacteria of the intestinal group. Campylobacter. Helicobacter. Features of microbiological diagnosis in connection with the pathogenesis of diseases. Principles of treatment, prevention.	1	3
		Lecture		

4	7	The causative agents of zoonotic infections. Brucellosis, plague, anthrax, tularemia. Features of microbiological diagnosis in connection with the pathogenesis of diseases. Statement of the reaction of Ascoli, Hedelson, Wright. Interpretation of the results. Principles of treatment, prevention.	2	
	8	**Practical lesson** The causative agents of zoonotic infections. Brucellosis, plague, anthrax, tularemia. Features of microbiological diagnosis in connection with the pathogenesis of diseases. Statement of the reaction of Ascoli, Hedelson, Wright. Interpretation of the results. Principles of treatment, prevention.	1	3
5	9	**Lecture**	2	
	10	**Colloquium 1**	1	19
		Interim examination 1		**31**
6	11	**Lecture** Pathogenic and conditionally pathogenic corynebacterium. Bordetella. Algorithm for laboratory diagnosis of diphtheria, pertussis and pertussis. Features of microbiological diagnosis in connection with the pathogenesis of diseases. Formulation of the Ouchterlony reaction. Interpretation of the results. Principles of treatment, prevention.	2	
	12	**Practical lesson** Pathogenic and conditionally pathogenic corynebacterium. Bordetella. Algorithm for laboratory diagnosis of diphtheria, pertussis and pertussis. Features of microbiological diagnosis in connection with the pathogenesis of diseases. Formulation of the Ouchterlony reaction. Interpretation of the results. Principles of treatment, prevention.	1	3
7	13	**Lecture** Pathogenic and opportunistic mycobacteria. Tuberculosis. Features of microbiological diagnosis in connection with the pathogenesis of diseases. Algorithm for laboratory diagnosis of tuberculosis. Principles of treatment, prevention Leprosy. Features of microbiological diagnosis in connection with the pathogenesis of diseases. Principles of treatment, prevention.	2	
	14	**Practical lesson** Pathogenic and opportunistic mycobacteria. Tuberculosis. Features of microbiological diagnosis in connection with the pathogenesis of diseases. Algorithm for laboratory diagnosis of tuberculosis. Principles of treatment, prevention Leprosy. Features of microbiological diagnosis in connection with the pathogenesis of diseases. Principles of treatment, prevention.	1	3
	15	**Lecture** Pathogens of sexually transmitted diseases. Spirochetes. Mycoplasmas. Chlamydia Algorithm for laboratory diagnosis of sexually transmitted diseases. Features of microbiological	2	

8		diagnosis in connection with the pathogenesis of diseases. Principles of treatment, prevention.		
	16	**Practical lesson** Pathogens of sexually transmitted diseases. Spirochetes. Mycoplasmas. Chlamydia Algorithm for laboratory diagnosis of sexually transmitted diseases. Features of microbiological diagnosis in connection with the pathogenesis of diseases. Principles of treatment, prevention.	1	3
9	17	**Lecture** The causative agents of anaerobic infections. Algorithm for laboratory diagnosis of anaerobic infections. Features of microbiological diagnosis in communication with the pathogenesis of diseases. Principles of treatment, prevention. Rickettsia, Borrelia. Features of microbiological diagnosis in connection with the pathogenesis of diseases. Principles of treatment, prevention.	2	
	18	**Practical lesson** The causative agents of anaerobic infections. Algorithm for laboratory diagnosis of anaerobic infections. Features of microbiological diagnosis in communication with the pathogenesis of diseases. Principles of treatment, prevention. Rickettsia, Borrelia. Features of microbiological diagnosis in connection with the pathogenesis of diseases. Principles of treatment, prevention.	1	3
		IWST: consultation for the implementation of the IWS	2	
10	19	**Lecture**	2	
	20	**Colloquium 2**	1	19
		Midterm examination		**31**
11	21	**Lecture** Adenoviruses. Poxviruses. Rhabdoviruses. Role in human pathology. The principles of treatment. Prevention Orthomyxoviruses (influenza virus). Paramyxoviruses (viruses of parainfluenza, mumps, measles, respiratory syncytial virus). Statement of RGA, RTGA, RTGA in paired sera. Interpretation of the results.	2	
	22	**Practical lesson** Adenoviruses. Poxviruses. Rhabdoviruses. Role in human pathology. The principles of treatment. Prevention Orthomyxoviruses (influenza virus). Paramyxoviruses (viruses of parainfluenza, mumps, measles, respiratory syncytial virus). Statement of RGA, RTGA, RTGA in paired sera. Interpretation of the results.	1	3
		IWST: consultation for the implementation of the IWS	2	
		Lecture		

12	23	Picornaviruses - causative agents of poliomyelitis, Coxsackie viruses, ECHO. Principles of treatment, prevention. Statement of reaction of color test. Interpretation of the results. Color sample mechanism Arboviruses. Role in human pathology. The principles of treatment. Prevention Rubella virus. Role in the pathology of pregnant women. Principles of treatment, prevention.	2	
	24	**Practical lesson** Picornaviruses - causative agents of poliomyelitis, Coxsackie viruses, ECHO. Principles of treatment, prevention. Statement of reaction of color test. Interpretation of the results. Color sample mechanism Arboviruses. Role in human pathology. The principles of treatment. Prevention Rubella virus. Role in the pathology of pregnant women. Principles of treatment, prevention.	1	3
		IWST: consultation for the implementation of the IWS	2	
13	25	**Lecture** AIDS virus. ELISA for the diagnosis of HIV infection. Interpretation of the results. Principles of treatment, prevention. Oncoviruses. Principles of treatment, prevention. CMV infection. Role in human pathology. The principles of treatment. Prevention	2	
	26	**Practical lesson** AIDS virus. ELISA for the diagnosis of HIV infection. Interpretation of the results. Principles of treatment, prevention. Oncoviruses. Principles of treatment, prevention. CMV infection. Role in human pathology. The principles of treatment. Prevention	1	3
		IWST: consultation for the implementation of the IWS	2	
14	27	**Lecture** Hepatitis A, B, C. viruses. Treatment principles, prevention. Herpes viruses (alpha beta, gamma herpes viruses). Principles of treatment, prevention. Fungal infections or mycoses.	2	
	28	**Practical lesson** Hepatitis A, B, C. viruses. Treatment principles, prevention. Herpes viruses (alpha beta, gamma herpes viruses). Principles of treatment, prevention. Fungal infections or mycoses.	1	3
		IWST: consultation for the implementation of the IWS	2	
15	29	**Lecture**	2	
	30	**Colloquium 3**	1	15
		IWST: delivery of IWS "Features of hepatitis A, B, C". Treatment approaches to COVID 19 complications.	5	4
		Interim examination 2		**31**
III. GENERAL PHARMACOLOGY				

1	1	**Lecture** Introduction to Pharmacology.The value of the subject. Dosage Forms. INN, trade names. Drug prescription.	2	
	2	**Practical lesson** Introduction to Pharmacology.The value of the subject. Dosage Forms. INN, trade names. Drug prescription.	2	4
2	3	**Lecture** Pharmacokinetics. Principles of interaction between human bodies and drugs. Absorption, distribution, biotransformation and excretion of chemicals. Effects of impaired organ functions on pharmacokinetics.	2	
	4	**Practical lesson** Pharmacokinetics. Principles of interaction between human bodies and drugs. Absorption, distribution, biotransformation and excretion of chemicals. Effects of impaired organ functions on pharmacokinetics.	2	4
3	5	**Lecture** Pharmacodynamics. Receptors. Principles of interaction between human bodies and drugs. Different mechanisms of action – agonism and antagonism to different types and subtypes of receptors, inhibition of enzymes, blocking or opening of channels.	2	
	6	**Practical lesson** Pharmacodynamics. Principles of interaction between human bodies and drugs. Different mechanisms of action – agonism and antagonism to different types and subtypes of receptors, inhibition of enzymes, blocking or opening of channels.	2	4
4	7	**Lecture** PNS. Cholinergic drugs. Acetylcholine, it's effects on healthy human body. M and N cholinoreceptors, different subtypes. cholinomimetics. Cholinesterase inhibitors.	2	
	8	**Practical lesson** PNS. Cholinergic drugs.Acetylcholine, it's effects on healthy human body. M and N cholinoreceptors, different subtypes. cholinomimetics. Cholinesterase inhibitors.	2	4
5	9	**Lecture** PNS. Cholinergic drugs. Cholinoblockers. Cholinesterase reactivators	2	
	10	**Practical lesson** **Colloquium 1** Cholinergic drugs. Cholinoblockers, Cholinesterase reactivators	2	22
		Interim examination 1		**38**
	11	**Lecture** PNS. Adrenergic drugs. Noradrenaline and adrenaline (Norepinephrine and epinephrine), their functions in healthy	2	

6		human body. Alfa and beta adrenoreceptors, different subtypes. Adrenomimetics. Sympathomimetics		
	12	**Practical lesson** PNS. Adrenergic drugs. Noradrenaline and adrenaline (Norepinephrine and epinephrine), their functions in healthy human body. Alfa and beta adrenoreceptors, different subtypes. adrenomimetics.	2	4
7	13	**Lecture** Adrenoblockers. Alfa beta adrenoceptor antagonists, Sympatholytics	2	
	14	**Practical lesson** Adrenoblockers. Alfa beta adrenoceptor antagonists, Sympatholytics	2	4
		IWST: consultation for the implementation of the IWS	2	
8	15	**Lecture** CVD, Diuretics, Ca blockers, Nitrates, ACEI	2	
	16	**Practical lesson** CVD, Diuretics, Ca blockers, Nitrates, ACEI	2	4
		IWST: consultation for the implementation of the IWS	2	
9	17	**Lecture** Pharmacology of the hematopoietic system and hemostasis. Preparations for the treatment of anemia. Coagulation disorders. Drugs, enhancing drugs and reducing coagulation. Drugs, increasing and reducing platelet aggregation.	2	
	18	**Practical lesson** Pharmacology of the hematopoietic system and hemostasis. Preparations for the treatment of anemia. Coagulation disorders. Drugs, enhancing drugs and reducing coagulation. Drugs, increasing and reducing platelet aggregation. **Colloquium 2**	2	22
		IWST: consultation for the implementation of the IWS	2	
10	19	**Lecture** Diabetes	2	
	20	**Practical lesson.** Diabetes	2	4
		IWST: consultation for the implementation of the IWS	2	
		Midterm		**38**
11	21	**Lecture** Anti-inflammatory drugs. Signs of inflammation. inflammatory mechanisms.	2	
	22	**Practical lesson**	2	4

		Anti-inflammatory drugs. Signs of inflammation. inflammatory mechanisms.		
		IWST: consultation for the implementation of the IWS	2	
12	23	**Lecture** Opioid system. Opioid agonists and antagonists. addiction.	2	
	24	**Practical lesson** Opioid system. Opioid agonists and antagonists. addiction.	2	4
		IWST: consultation for the implementation of the IWS	2	
13	25	**Lecture** Antibiotics. Principles of antimicrobial therapy. Mechanisms of formation, prevention and overcoming of resistance. beta-lactams, Macrolides, Tetracyclines, Aminoglycosides.	2	
	26	**Practical lesson** Antibiotics. Principles of antimicrobial therapy. Mechanisms of formation, prevention and overcoming of resistance. beta-lactams, Macrolides, Tetracyclines, Aminoglycosides.	2	4
14	27	**Lecture** Antibiotics. Peptide antibiotics. Nitroimidazoles and nitrofurans. fluoroquinolones. Linezolid. Sulfonamides. Trimethoprim.TB.	2	
	28	**Practical lesson** Antibiotics. Peptide antibiotics. Nitroimidazoles and nitrofurans. fluoroquinolones. Linezolid. Sulfonamides. Trimethoprim.TB.	2	4
		IWST: consultation for the implementation of the IWS	2	
15	29	**Lecture** Antiviral drugs. Treatment of HIV infection. Antifungals	2	
	30	**Practical lesson.** Antiviral drugs. Treatment of HIV infection. Antifungals **Colloquium 3**	2	18
		IWST: delivery of IWS "Pharmacology Nowadays". Contemporary Medical Treatment approaches to actual diseases.	6	4
		Interim examination 2		**38**