**AL-FARABI KAZAKH NATIONAL UNIVERSITY**

**Faculty of Medicine and Healthcare**

**Higher School of Medicine**

**Department of ​Fundamental Medicine**

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|  | AFFIRM  Dean of the Faculty  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (signature)  Kalmatayeva Z.A.  "\_\_\_\_\_\_" \_\_\_\_\_\_\_\_ 2021 |

EDUCATIONAL AND METHODICAL COMPLEX OF DISCIPLINE

**MZiB2216 "Mechanisms of Defense and Disease**

Specialty "B086"

Educational program “General medicine”

Course – 2

Semester – 2

Number of credits – 10

Аlmaty 2021

Educational and methodical complex of discipline was compiled by

doctor of biology science, associate professor **Jumasheva Rakhima**, candidate of medical science **Battalova Kuralay**, master of science in biology **Kakimova Ardak**, MD **Klepikov Dmitriy**

Based on the working curriculum in the specialty B086 General medicine

Considered and recommended at a meeting of the department fundamental medicine

from "\_\_\_" \_\_\_\_\_\_\_\_\_\_ 2021, protocol No. \_\_

Head of the department \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Sarsenova L.K.

Recommended by the faculty methodical bureau

"\_\_\_\_"\_\_\_\_\_\_\_\_\_\_ 2021, protocol No. \_\_\_

Chairman of the method bureau of the faculty \_\_\_\_\_\_\_\_\_\_\_ Dzhumasheva R.T.

**Al-Farabi Kazakh National University**

***Higher School of Medicine***

***Department of Fundamental Medicine***

**SYLLABUS**

**2020-2021 academic year**

**on the educational program “General medicine”**

**Academic course information**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Discipline’s code** | **Discipline’s**  **title** | **Type** | **No. of hours per week** | | | **Number**  **of credits** | **ECTS** |
| Lect. | Pract. | Lab. |
| MZiB2216 | Mechanisms of Defense and Disease | BD  UC | 5 | 5 | 0 | 10 | 10 |
| **Teacher of Medical Genetics** | **Lazzat Sarsenova**  candidate of biological sciences | | | **Office hours** | |  | |
| e-mail | sarsenova.lazzat@med-kaznu.com | | |  | |  | |
| Phone number | +77273773333 | | | **Auditorium** | | Faculty of Medicine and Healthcare | |
| **Teacher of Medical Genetics** | **Akbota Targynova**, MSc, PhD candidate | | | **Office hours** | |  | |
| e-mail | targynova.akbota@med-kaznu.com | | |
| Phone number | 87011508580 | | | **Online** | | Faculty of Medicine and Healthcare | |
| **Teacher of medical genetics** | **Karakoz Tolenova**, MSc, PhD candidate | | | **Office hours** | |  | |
| e-mail | [tolenova.karakoz@med-kaznu.c](mailto:tolenova.karakoz@med-kaznu.com)om | | |
| Phone number | +77052122753 | | | **Auditorium** | | Faculty of Medicine and Healthcare | |
| **Teacher of medical genetics** | **Aray Ussenbayeva,** MD, MSc | | |  | |  | |
| e-mail | ussenbayeva.aray@med-kaznu.com | | |  | |  | |
| Phone number | 87759899754 | | | **Online** | | Faculty of Medicine and Healthcare | |
| **Teacher of microbiology** | **Ardak Kakimova**, MSc, PhD student | | | **Office hours** | |  | |
| e-mail | Ardakkakimova1@gmail.com | | |
| Phone number | 87087682362 | | | **Online** | | Faculty of Medicine and Healthcare | |
| **Teacher of microbiology** | **Alina Alibekova**, MSc | | | **Office hours** | |  | |
| **e-mail** | alibekova.alina@med-kaznu.com | | |
| **Phone number** | +77082143867 | | | **Online** | | Faculty of Medicine and Healthcare | |
| **Teacher of microbiology** | **Aliya Qudaibergenova,** MSc | | | **Office hours** | |  | |
| **e-mail** | kudaibergenova.aliya@med-kaznu.com | | |
| **Phone number** | +77474012625 | | | **Online** | | Faculty of Medicine and Healthcare | |
| **Teacher of microbiology** | **Gulzhan Ilderbayeva,** PhD | | | **Office hours** | |  | |
| **e-mail** | gulzhan.ilderbayeva@nao-mus.kz | | |
| **Phone number** | +77077367757 | | | **Online** | | Faculty of Medicine and Healthcare | |
| **Teacher of Pharmacology** | **Tamila Akhayeva, PhD** | | | **Office hours** | |  | |
| e-mail | Akhayeva.tamila@kaznu-med.gmail.com | | |
| Phone number | +7 7773060445 | | | **Online** | | Faculty of Medicine and Healthcare | |
| **Teacher of Pharmacology** | **Aisulu Isabekova** | | | **Office hours**  **Online** | |  | |
| e-mail | isabekova.aisulu@med-kaznu.com | | |
| Phone number | +77086254901 | | | Faculty of Medicine and Healthcare | |
| **Teacher of Pharmacology** | **Shlymova Raikhan**  Associate Professor | | | **Office hours** | |  | |
| e-mail | raikhan@med-kaznu.com | | |
| Phone number | +77076846902 | | | **Online** | | Faculty of Medicine and Healthcare | |
| **Teacher of Pharmacology** | **Zhumagaliyeva Kamila**  **MD., Msc.** | | | **Office hours** | |  | |
| e-mail | zhumagaliyeva.kamila@med-kaznu.com | | |
| Phone number | +77780850421 | | | **Online** | | Faculty of Medicine and Healthcare | |
| **Teacher of Pharmacology** | Aliuly Sultan | | | **Office hours** | |  | |
| e-mail | aliuly.sultan@med-kaznu.com | | |  | |  | |
| Phone number | +77029935454 | | | **Online** | | Faculty of Medicine and Healthcare | |
| **Teacher of Pharmacology** | Mussabayev Yersaiyn | | | **Office hours** | |  | |
| e-mail | mussabayev.yersaiyn@med-kaznu.com | | |  | |  | |
| Phone number | 87473683825 | | | **Online** | | Faculty of Medicine and Healthcare | |

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| --- | --- |
| **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**: to form skills of interpreting modern biochemical methods for diagnosing diseases and correcting metabolic disorders, 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.  **After completing this course students will**:   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** | Mechanisms of Defense and Health |
| **Post requisites** | 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](http://cat.lib.unimelb.edu.au/search~S30?/hElsevier%2C/helsevier/-3,-1,0,B/browse) 2. Maheshwari, Nanda. Clinical Microbiology and Patology [Text] : for DMLT Students / N. Maheshwari ; Damyanti DMLT Institute. - 3rd ed. - New Delhi ; London ; Philadelphia : Jaypee, 2016. - 498 p. : il. - ISBN 978-93-5250-018-5 3. Textbook of Diagnostic Microbiology [Electronic resource] : textbook / C. Mahon, D. Lehman, G. Manuselis. - 5th ed. - St. Louis, Missouri : Elsevier, 2011. - 1097 p. - ISBN 978-0-323-08989-0 4. 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 5. Essentials Of Medical Pharmacology by K.D. Tripathi [Electronic resource]: textbook / K.D. Tripathi. - 8th ed. - Jaypee Brothers Medical Publishers (P) Ltd:, 2019. - 1080 p. - ISBN 78-9352704996   **Additional literature:**   1. Levinson, Warren. Review of Medical Microbiology and Immunology [Electronic resource] : monograph / W. Levinson. - 13th ed. - New York ; Chicago ; San Francisco : McGraw Hill, 2014. - 1950 p. - ISBN 978-0-07-181812-4 : W. p. 2. Tets V.V. Guide to practical exercises in medical microbiology, virology and immunology - M.: Medicine, 2002. - 352 p. 3. Jorde, L.B. et al. (2016) Medical Genetics. [Philadelphia, PA : Elsevier](http://cat.lib.unimelb.edu.au/search~S30?/hElsevier%2C/helsevier/-3,-1,0,B/browse) 4. Emery’s Elements of Medical Genetics (2017) Turnpenny, P.D., Ellard S. 15th Edition, Elsevier 5. Alberts, B. et al (2015) Molecular biology of the cell 6th edition. New York, NY: Garland Science 6. Lodish, H. et al (2016) Molecular Cell Biology 8 th edition. W.H.Freeman 7. Alberts, B. (2014) Essential Cell Biology 4th edition. New York, NY: Garland Science 8. Hartwell, L. et al (2017) Genetics: from genes to genomes, 6th edition. New York, NY: McGrawHill Education 9. USMLE Step 1 Lecture Notes (2017): Biochemistry and Medical Genetics. [Kaplan Publishing](https://www.bookdepository.com/publishers/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](https://www.genomicseducation.hee.nhs.uk/education/) 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** | **Academic behavior rules.**  *Attendance policy*  Attendance for class is mandatory. Attendance for an additional extracurricular research activity is highly recommended for increasing the course assessment. No less than 50% attendance is required for the lectures and workshops. Additional research activities are not required, but highly beneficial for the course better comprehension.  *Class participation*  All students are expected to participate in class activities and discussions.  *Classroom decorum*  All unrelated activities are prohibited during a lecture and workshop time. Cell phones, computer games and unrelated Internet and computer activities are strictly prohibited.  *Missed exams*  Students can retake midterm exams with an official document for the days of absence. Other excuses are not accepted and the exam will be annulated. Missing of the final exam is registered according to the rules of Academic Policy of the University.  *Late assignments*  Late assignments, projects, reports and etc. are not accepted with no excuses.  *Appeals policy*  Students may appeal instructor decisions by speaking directly with him. If a solution is not found students can consult with the Head of the Department.  *Electronic resources*  You are expected to regularly check your emails for updates and announcements  about the course.  *Plagiarism and Cheating*  As a student, you are expected to adhere to the norms of academic integrity. Academic dishonesty includes plagiarism, cheating, fabrication, unauthorized collaboration, use of notes during exams and quizzes, and other forms. These students  will be given 0 with no further retake activities.  **Academic values.**  *Academic honesty*  There will be no tolerance for lapses of academic integrity. A student found to be guilty of falsifying, plagiarism and cheating or any other form of academic dishonesty will be given a failing grade.  *Tolerance and non-discrimination*  There is zero tolerance for unsafe activity in the laboratory during workshops and additional research activities. There will be no discrimination per nationality, gender and anything else. |
| **Evaluation and attestation policy** | **Criteria-based evaluation:** evaluation of study results in accordance with the descriptors, test of competencies (the results of study that are indicated in goal of the course) at border control and examinations.  **Testing** (open and closed questions) with situational tasks, diagrams, microphotographs) - current / midterm / final control: learning outcomes № 1-8  **Written / oral quiz** - current / midterm / final control: learning outcomes № 1-8  **Group Problem solving (cases**) - current control: learning outcomes № 1-8  **Direct observation** - current control /SIW: learning outcomes № 1-8  **Summative evaluation:**   1. The course is planned to hold 3 colloquiums in each discipline: medical genetics, microbiology and pharmacology. 2. For the semester, admission to the final exam rating points: RD = (RK1 + MT (Mid-Term) + RK2) / 3, where RK1 / RK2 / MT = the sum of all points for classes + points for colloquiums and SIW of the corresponding period. 3. RK1 - 1-5 weeks, MT- 6-10 weeks, RK2 - 11-15 weeks. The final control (exam) is carried out by testing or oral examination. The final grade for the discipline = RD \* 0.6 + Exam \* 0.4 |

**CALENDAR (SCHEDULE) THE IMPLEMENTATION OF THE COURSE CONTENT:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **# of Week** | **# of Lesson** | **Topic name** | **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** “ Chromosomal disorders” | 1 | 19 |
| 5 | 5 | **Lecture**  Mendelian classic disorders: autosomal inheritance | 1 |  |
|  |  | **Practical lesson**  Mendelian classic disorders: autosomal inheritance | 2 | 3 |
|  |  | **Mid-term 1** | **15** | **31** |
| 6 | 6 | **Lecture**  Mendelian classic disorders: sex-linked inheritance | 1 |  |
|  |  | **Practical lesson**  Mendelian classic disorders: sex-linked inheritance | 2 | 3 |
| 7-8 | 7-8 | **Lecture**  Non-mendelian genetic disorders | 2 |  |
|  |  | **Practical lesson**  Non-mendelian genetic disorders | 4 | 6 |
| 9 | 9 | **Lecture**  Fundamentals of population genetics | 1 |  |
|  |  | **Practical lesson**  Fundamentals of population genetics | 1 |  |
|  |  | **Colloquium** “Mendelian and non-mendelian genetic disorders.” | 1 | 19 |
| 10 | 10 | **Lecture**  Fundamentals of population genetics | 1 |  |
|  |  | **Practical lesson**  Fundamentals of population genetics | 2 | 3 |
|  |  | **Mid-term 2** | **15** | **31** |
| 11-12 | 11-12 | **Lecture**  Polygenic multifactorial disorders | 2 |  |
|  |  | **Practical lesson**  Polygenic multifactorial disorders | 4 | 6 |
| 13 | 13 | **Lecture**  Cancer Genetics and Genomics | 1 |  |
|  |  | **Practical lesson**  Cancer Genetics and Genomics | 2 | 3 |
| 14 | 14 | **Lecture**  Polygenic disorders: developmental malformation | 1 |  |
|  |  | **Practical lesson**  Polygenic disorders: developmental malformation | 2 | 3 |
|  |  | **Student Independent Work** | 30 | 4 |
| 15 | 15 | **Lecture**  Polygenic disorders: developmental malformation | 1 |  |
|  |  | **Colloquium** “Population genetics. Cancer Genetics and Genomics. Polygenic multifactorial disorders” | 2 | 15 |
|  |  | **Mid-term 3** |  | **31** |
|  |  | **Total Genetics lecture Hours** | 15 |  |
|  |  | **Total Practical lesson Hours** | 30 |  |
| **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 |  |
| 1 | 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 |  |
| 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 |  |
| 3 | 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 |
| 4 | 7 | **Lecture**  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 |  |
| 4 | 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 |
|  | 9 | **Lecture** | 2 |  |
| 5 | 10 | **Colloquium 1** | 1 | 19 |
|  |  | **Mid-term I** |  | **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 |  |
| 6 | 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 |  |
| 7 | 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 |
| 8 | 15 | **Lecture**  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. | 2 |  |
| 8 | 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 |
| 8 | 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 |  |
| 9 | 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 |
|  | 19 | **Lecture** | 2 |  |
| 10 | 20 | **Colloquium 1** | 1 | 19 |
|  |  | **Mid-term II** |  | **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 |  |
| 11 | 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 |
| 12 | 23 | **Lecture**  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 |  |
| 12 | 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 |
| 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 |  |
| 13 | 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 |
| 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 |  |
| 14 | 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 |
| 15 | 29 | Student Independent Work Topic **“Features of hepatitis A, B, C”.** | 2 | 4 |
| 15 | 30 | Colloquium 3 | 1 | 15 |
|  |  | **Mid-term III** | 45 | **31** |
| **III. GENERAL PHARMACOLOGY** | | | | |
| 1 | 1 | **Lecture**  Introduction to Pharmacology.The value of the subject. Dosage Forms. INN, trade names. Drug prescription. | 2 |  |
| 1 | 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 |  |
| 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 |  |
| 3 | 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 |  |
| 4 | 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 |  |
| 5 | 10 | **Practical lesson.**  Colloquium 1 Cholinergic drugs. Cholinoblockers, Cholinesterase reactivators | 2 | 22 |
|  |  | **Mid-term I** |  | **38** |
| 6 | 11 | **Lecture**  PNS. Adrenergic drugs. Noradrenaline and adrenaline (Norepinephrine and epinephrine), their functions in healthy human body. Alfa and beta adrenoreceptors, different subtypes. Adrenomimetics. Sympathomimetics | 2 |  |
| 6 | 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 |  |
| 7 | 14 | **Practical lesson.**  Adrenoblockers. Alfa beta adrenoceptor antagonists, Sympatholytics | 2 | 4 |
| 8 | 15 | **Lecture**  CVD, Diuretics, Ca blockers, Nitrates, ACEI | 2 |  |
| 8 | 16 | **Practical lesson.**  CVD, Diuretics, Ca blockers, Nitrates, ACEI | 2 | 4 |
| 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 |  |
| **9** | **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** |
| 10 | 19 | **Lecture**  Diabetes | 2 |  |
| 10 | 20 | **Practical lesson.**  Diabetes | 2 | 4 |
|  |  | **Mid-term II** |  | **38** |
| 11 | 21 | **Lecture**  Anti-inflammatory drugs. Signs of inflammation. inflammatory mechanisms. | 2 |  |
| 11 | 22 | **Practical lesson.**  Anti-inflammatory drugs. Signs of inflammation. inflammatory mechanisms. | 2 | 4 |
| 12 | 23 | **Lecture**  Opioid system. Opioid agonists and antagonists. addiction. | 2 |  |
| 12 | 24 | **Practical lesson.**  Opioid system. Opioid agonists and antagonists. addiction. | 2 | 4 |
| 13 | 25 | **Lecture**  Antibiotics. Principles of antimicrobial therapy. Mechanisms of formation, prevention and overcoming of resistance.  beta-lactams, Macrolides, Tetracyclines, Aminoglycosides. | 2 |  |
| 13 | 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 |  |
| 14 | 28 | **Practical lesson.**  Antibiotics. Peptide antibiotics. Nitroimidazoles and nitrofurans. fluoroquinolones. Linezolid. Sulfonamides. Trimethoprim.TB. | 2 | 4 |
| 15 | 29 | **Lecture**  Antiviral drugs. Treatment of HIV infection. Antifungals | 2 |  |
| 15 | 30 | **Practical lesson.**  Antiviral drugs. Treatment of HIV infection. Antifungals  Colloquium 3 | 2 | 22 |
|  |  | **Student Independent Work Topic** “Pharmacology nowadays”**.** |  | 4 |
|  |  | **Mid-term III** |  | **38** |
|  |  | **Total** |  | **300** |

[Abbreviations: QS - questions for self-examination; TK - typical tasks; IT - individual tasks; CW - control work; MT - midterm.

 Comments:

- Form of L and PT: webinar in MS Teams / Zoom (presentation of video materials for 10-15 minutes, then its discussion / consolidation in the form of a discussion / problem solving / ...)

- Form of carrying out the CW: webinar (at the end of the course, the students pass screenshots of the work to the monitor, he/she sends them to the teacher) / test in the Moodle DLS.

- All course materials (L, QS, TK, IT, etc.) see here (see Literature and Resources, p. 6).

- Tasks for the next week open after each deadline.

- CW assignments are given by the teacher at the beginning of the webinar.]

Head of the Department \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Sarsenova L.K.

Chairman of the Faculty Methodical Bureau \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Dzhumasheva R.T.