SYLLABUS
MZiB 2209 /Defense and disease
(Medical genetics, medical microbiology, medical pharmacology)

Part A:			
1.	**Academic course information**		
1.1	Faculty/school: Faculty of Medicine and Healthcare Higher School of Medicine Department of Fundamental Medicine	1.6	Credits number (ECTS): – 10 lectures - 5 credits / practical lessons 5 credits
1.2	Educational program: B086 «General medicine»	1.7	Prerequisites: Mechanisms of Defense and Health
1.3	The Agency and the year of accreditation of the educational program: NU "INDEPENDENT AGENCY OF ACCREDITATION AND RATING" 2021	1.8	IWS: 3.3 credits
1.4	Name of the course: Mechanisms of Defense and Disease	1.9	IWST: 1.7 credits
1.5	Course ID: 90296 MZiB 2209	1.10	Essential -yes, Elective - no
2.	**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.		
3	**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.		
4.	**Learning outcomes of discipline:**		
	Learning outcomes of discipline		
	1. to apply knowledge about molecular and genetic aspects of genetically determined diseases (chromosomal, monogenic, polygenic); understand the principles of genetic diagnostics and medical genetic counseling.	1. to apply detailed knowledge of the typical structure and functions of the human body at the level - from molecules, cells, to organs and systems, the body as a whole	
	2. to apply knowledge of molecular-genetic, biochemical mechanisms of the body's response to drugs and biologically active compounds.	2. to apply detailed knowledge of the typical structure and functions of the human body at the level - from molecules, cells, to organs and systems, the body as a whole	
	3. to understand the biochemical processes in the main pathological conditions and genetically determined diseases.	3. to identify and solve problems that affect human health based on the application of knowledge about the main pathological processes and the biological damage they cause	
	4. to apply knowledge of the infectious process and its features in various types of human pathogens, apply knowledge of immunodiagnostics of infectious diseases,	4. to identify and solve problems that affect human health based on the application of knowledge about the main pathological processes and the biological damage they cause	
	5. to apply knowledge of immunoprophylaxis, demonstrate an understanding of the principles of infection control and biosafety interpret the results of specific molecular genetic diagnostic methods	5. to identify and solve problems that affect human health based on the application of knowledge about the main pathological processes and the biological damage they cause	
	6. to understand the role of relevant risk factors of diseases for decision-making with a view to their prevention.	6. to apply knowledge of the principles and methods of forming a healthy lifestyle for a person and family, population health; apply knowledge of a complex of factors that determine health and disease for the purpose of prevention.	

	7. to 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	7. to apply detailed knowledge of the typical structure and functions of the human body at the level - from molecules, cells, to organs and systems, the body as a whole
	8. to know the pharmacokinetic parameters, mechanisms of absorption and biotransformation of drugs.	8. to apply detailed knowledge of the typical structure and functions of the human body at the level - from molecules, cells, to organs and systems, the body as a whole.
	9. to 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). To know the types of undesirable side reactions and understand the possibilities of their correction.	9. to identify and solve problems affecting human health based on the application of knowledge about the underlying pathological processes and the biological damage they cause. Integrate clinical knowledge and skills to provide an individual approach to the treatment of a particular patient and the promotion of his health in accordance with his needs; make professional decisions based on the analysis of the rationality of diagnostics and applying the principles of evidence-based and personalized medicine.
	10. to demonstrate the ability to identify learning gaps and create strategies to enhance one's own knowledge and skills.	10. to participate in scientific research aimed at advancing knowledge in the field of human health and improving the quality of life; strive for new knowledge, generate new knowledge; be capable of effective learning and transferring knowledge to others throughout their careers.
	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	11. to work effectively in an interprofessional / multidisciplinary team with other healthcare professionals in organizing and managing the diagnostic and treatment process; collect and communicate medical information, orally and in writing, to provide safe and effective patient care.

5.	**Summative assessment methods (mark (yes – no) / specify your own):**		
5.1	MCQ testing for understanding and application	5.5	Essay
5.2	Case study	5.6	Paper work
5.3	Project (individual/group)	5.7	Curriculum control: written
5.4	Discussion	5.8	The exam: written

Part B

6.	**Academic course information**		
6.1	Academic year: 2023-2024	6.3	Schedule (days of classes, time): days of the week: Mon-Sat Time: 8.00-20.00
6.2	Semester: 4 semester	6.4	Location (building, office, platform and link to the meeting of learning with the use of distance learning technologies): Adrees : st. Tole bi 96

7. Teachers

Position	**Name**	**Department**	**Contact information (tel., e-mail)**	**Time for consultations or by appointment**
Teacher of Medical Genetics	Akbota Targynova	DFM	87011508580 targynova.akbota@med-kaznu.com	

Teacher of Medical Genetics	Zaure Dushimova	DFM	87017992330 Dushimova.zaure@med-kaznu.com	
Teacher of Microbiology	Moldir Sharipova	DFM	877762009201, Sharipova.moldir@med-kaznu.com	
Teacher of Microbiology	Aliya Kudaibergenova	DFM	87474012625, aliya.kuday@gmail.com	
Teacher of Pharmacology	Tamila Akhayeva	DFM	87773060445 akhayeva.tamila@med-kaznu.com	
Teacher of Pharmacology	Aida Seitaliyeva	DFM	87002246495 seitaliyeva.aida@med-kaznu.com	

8.	**Content of the discipline**	
Medical genetics		
Week	**Topics and tasks**	**Hours**
1-2.	**Lecture** Introduction to Medical Genetics. Chromosomal disorders	2
	Practical lesson Introduction to Medical Genetics. Chromosomal disorders	4
	Tasks (if available)	
	Literature Robert L. Nussbaum, Roderick R. McInnes, Huntington F. Willard // Genetics in medicine 8th edition: Elsevier – 2016, p 75-87.	
3.	**Lecture** Sex Chromosome disorders.	1
	Practical lesson Sex Chromosome disorders.	2
	Tasks (if available)	
	Literature Robert L. Nussbaum, Roderick R. McInnes, Huntington F. Willard // Genetics in medicine 8th edition: Elsevier – 2016, p 87-105	
	IWST: consultation for the implementation of the IWS	3
4-5.	**Lecture** Mendelian classic disorders: autosomal inheritance	2
	Practical lesson Mendelian classic disorders: autosomal inheritance	4
	Tasks (if available)	
	Literature Robert L. Nussbaum, Roderick R. McInnes, Huntington F. Willard // Genetics in medicine 8th edition: Elsevier – 2016, p 107-117	
6.	**Lecture** Mendelian classic disorders: sex-linked inheritance	1
	Practical lesson Mendelian classic disorders: sex-linked inheritance	2
	Tasks (if available)	

	Literature Robert L. Nussbaum, Roderick R. McInnes, Huntington F. Willard // Genetics in medicine 8th edition: Elsevier – 2016, p 118-124	
	IWST: consultation for the implementation of the IWS	3
7.	**Lecture** Non-mendelian genetic disorders	1
	Colloquium 1 "Chromosomal disorders. Mendelian genetic disorders" **Practical lesson** Non-mendelian genetic disorders	2
	Tasks (if available)	
	Literature Robert L. Nussbaum, Roderick R. McInnes, Huntington F. Willard // Genetics in medicine 8th edition: Elsevier – 2016, p 124-132	
	IWST: delivery of IWS	1
Interim examination 1		
8.	**Lecture** Non-mendelian genetic disorders	1
	Practical lesson Non-mendelian genetic disorders	2
	Tasks (if available)	
	Literature Robert L. Nussbaum, Roderick R. McInnes, Huntington F. Willard // Genetics in medicine 8th edition: Elsevier – 2016, p 124-132	
	IWST: consultation for the implementation of the IWS	3
9-10.	**Lecture** Fundamentals of population genetics	2
	Practical lesson Fundamentals of population genetics	4
	Tasks (if available)	
	Literature Robert L. Nussbaum, Roderick R. McInnes, Huntington F. Willard // Genetics in medicine 8th edition: Elsevier – 2016, p 155-170	
11-12.	**Lecture** Polygenic multifactorial disorders	2
	Practical lesson Polygenic multifactorial disorders	4
	Tasks (if available)	
	Literature Robert L. Nussbaum, Roderick R. McInnes, Huntington F. Willard // Genetics in medicine 8th edition: Elsevier – 2016, p 133-153	
	IWST: consultation for the implementation of the IWS	3
13.	**Lecture** Cancer Genetics and Genomics	1
	Practical lesson Cancer Genetics and Genomics	2
	Tasks (if available)	
	Literature Robert L. Nussbaum, Roderick R. McInnes, Huntington F. Willard // Genetics in medicine 8th edition: Elsevier – 2016, p 309-332	
14.	**Lecture** Polygenic disorders: developmental malformation	1
	Practical lesson Polygenic disorders: developmental malformation	2
	Tasks (if available)	

	Literature Robert L. Nussbaum, Roderick R. McInnes, Huntington F. Willard // Genetics in medicine 8th edition: Elsevier – 2016, p 283-308	
	IWST: delivery of IWS	2
15.	**Lecture** Polygenic disorders: developmental malformation	1
	Practical lesson Polygenic disorders: developmental malformation Colloquium 2 "Non-mendelian genetic disorders. Population genetics. Cancer Genetics and Genomics. Polygenic multifactorial disorders"	2
	Tasks (if available)	
	Literature Robert L. Nussbaum, Roderick R. McInnes, Huntington F. Willard // Genetics in medicine 8th edition: Elsevier – 2016, p 283-308	
Interim examination 2		
Medical microbiology		
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
	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
	Tasks (if available)	
	Literature: Jawetz, Melnick & Adelberg's Medical microbiology. Geo F. Brooks, Karen C. Carroll, Janet S. Butel, Stephen A. Morse, Timothy A. Mietzner. 26th edition, 2013	
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
	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
	Tasks (if available)	
	Literature: Jawetz, Melnick & Adelberg's Medical microbiology. Geo F. Brooks, Karen C. Carroll, Janet S. Butel, Stephen A. Morse, Timothy A. Mietzner. 26th edition, 2013	
	IWST: consultation for the implementation of the IWS 1 "Features of hepatitis A, B, C".	2

3.	**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
	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
	Tasks (if available)	
	Literature: Jawetz, Melnick & Adelberg's Medical microbiology. Geo F. Brooks, Karen C. Carroll, Janet S. Butel, Stephen A. Morse, Timothy A. Mietzner. 26th edition, 2013	
4.	**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
	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
	Tasks (if available)	
	Literature: Jawetz, Melnick & Adelberg's Medical microbiology. Geo F. Brooks, Karen C. Carroll, Janet S. Butel, Stephen A. Morse, Timothy A. Mietzner. 26th edition, 2013	
	IWST: consultation for the implementation of the IWS 1 "Features of hepatitis A, B, C".	2
5.	**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
	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
	Tasks (if available)	
	Literature: Jawetz, Melnick & Adelberg's Medical microbiology. Geo F. Brooks, Karen C. Carroll, Janet S. Butel, Stephen A. Morse, Timothy A. Mietzner. 26th edition, 2013	
6.	**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	2

	of microbiological diagnosis in connection with the pathogenesis of diseases. Principles of treatment, prevention.	
	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
	Tasks (if available)	
	Literature: Jawetz, Melnick & Adelberg's Medical microbiology. Geo F. Brooks, Karen C. Carroll, Janet S. Butel, Stephen A. Morse, Timothy A. Mietzner. 26th edition, 2013	
7.	**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
	Practical lesson Colloquium 1 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
	Tasks (if available)	
	Literature: Jawetz, Melnick & Adelberg's Medical microbiology. Geo F. Brooks, Karen C. Carroll, Janet S. Butel, Stephen A. Morse, Timothy A. Mietzner. 26th edition, 2013	
	IWST: delivery of IWS 1 "Features of hepatitis A, B, C".	2
	Interim examination 1	
8.	**Lecture** The causative agents of anaerobic infections. Clostridial, non-clostridial and putrid anaerobic infection. Algorithm for laboratory diagnosis of anaerobic infections. Features of microbiological diagnosis in communication with the pathogenesis of diseases.	2
	Practical lesson The causative agents of anaerobic infections. Clostridial, non-clostridial and putrid anaerobic infection. Algorithm for laboratory diagnosis of anaerobic infections. Features of microbiological diagnosis in communication with the pathogenesis of diseases.	1
	Tasks (if available)	
	Literature: Jawetz, Melnick & Adelberg's Medical microbiology. Geo F. Brooks, Karen C. Carroll, Janet S. Butel, Stephen A. Morse, Timothy A. Mietzner. 26th edition, 2013	
9.	**Lecture** Adenoviruses. Poxviruses. Rhabdoviruses. Role in human pathology. The principles of treatment and prevention.	2
	Practical lesson Adenoviruses. Poxviruses. Rhabdoviruses. Role in human pathology. The principles of treatment and prevention.	1
	Tasks (if available)	
	Literature: Jawetz, Melnick & Adelberg's Medical microbiology. Geo F. Brooks, Karen C. Carroll, Janet S. Butel, Stephen A. Morse, Timothy A. Mietzner. 26th edition, 2013	
	IWST: consultation for the implementation of the IWS 2 "Treatment approaches to COVID 19 complications"	2

10.	**Lecture** 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
	Practical lesson 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
	Tasks (if available)	
	Literature: Jawetz, Melnick & Adelberg's Medical microbiology. Geo F. Brooks, Karen C. Carroll, Janet S. Butel, Stephen A. Morse, Timothy A. Mietzner. 26th edition, 2013	
11.	**Lecture** Picornaviruses - causative agents of poliomyelitis, Coxsackie viruses, ECHO. Principles of treatment, prevention. Statement of reaction of color test. 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
	Practical lesson Picornaviruses - causative agents of poliomyelitis, Coxsackie viruses, ECHO. Principles of treatment, prevention. Statement of reaction of color test. 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
	Tasks (if available)	
	Literature: Jawetz, Melnick & Adelberg's Medical microbiology. Geo F. Brooks, Karen C. Carroll, Janet S. Butel, Stephen A. Morse, Timothy A. Mietzner. 26th edition, 2013	
	IWST: consultation for the implementation of the IWS 2 "Treatment approaches to COVID 19 complications"	1
12.	**Lecture** AIDS virus. ELISA for the diagnosis of HIV infection. Principles of treatment, prevention. Oncoviruses. Principles of treatment, prevention. CMV infection. Role in human pathology. The principles of treatment and prevention.	2
	Practical lesson AIDS virus. ELISA for the diagnosis of HIV infection. Principles of treatment, prevention. Oncoviruses. Principles of treatment, prevention. CMV infection. Role in human pathology. The principles of treatment and prevention.	1
	Tasks (if available)	
	Literature: Jawetz, Melnick & Adelberg's Medical microbiology. Geo F. Brooks, Karen C. Carroll, Janet S. Butel, Stephen A. Morse, Timothy A. Mietzner. 26th edition, 2013	
	IWST: consultation for the implementation of the IWS 2 "Treatment approaches to COVID 19 complications"	1
13.	**Lecture** Hepatitis A, B, C. viruses. Treatment principles, prevention. Herpes viruses (alpha beta, gamma herpes viruses). Principles of treatment, prevention.	2
	Practical lesson Hepatitis A, B, C. viruses. Treatment principles, prevention. Herpes viruses (alpha beta, gamma herpes viruses). Principles of treatment, prevention.	1
	Tasks (if available)	

	Literature: Jawetz, Melnick & Adelberg's Medical microbiology. Geo F. Brooks, Karen C. Carroll, Janet S. Butel, Stephen A. Morse, Timothy A. Mietzner. 26th edition, 2013	
	IWST: consultation for the implementation of the IWS 2 "Treatment approaches to COVID 19 complications"	1
14.	**Lecture** Fungal infections or mycoses. Candidiasis, Cryptococcosis, Aspergillosis, Blastomycosis. Laboratory diagnostic, treatment principles, prevention.	2
	Practical lesson Fungal infections or mycoses. Candidiasis, Cryptococcosis, Aspergillosis, Blastomycosis. Laboratory diagnostic, treatment principles, prevention.	1
	Tasks (if available)	
	Literature: Jawetz, Melnick & Adelberg's Medical microbiology. Geo F. Brooks, Karen C. Carroll, Janet S. Butel, Stephen A. Morse, Timothy A. Mietzner. 26th edition, 2013	
	IWST: consultation for the implementation of the IWS 2 "Treatment approaches to COVID 19 complications"	2
15.	**Lecture** Nosocomial diseases. Classification, risks, prevention, clinical cases	2
	Practical lesson Colloquium 2 Nosocomial diseases. Classification, risks, prevention, clinical cases	1
	Tasks (if available)	
	Literature: Jawetz, Melnick & Adelberg's Medical microbiology. Geo F. Brooks, Karen C. Carroll, Janet S. Butel, Stephen A. Morse, Timothy A. Mietzner. 26th edition, 2013	
	IWST: delivery of IWS 2"Treatment approaches to COVID 19 complications"	2
	Interim examination 2	2
General pharmacology		
1.	**Lecture** Introduction to Pharmacology. The value of the subject. Dosage Forms. INN, trade names. Drug prescription.	2
	Practical lesson Introduction to Pharmacology.The value of the subject. Dosage Forms. INN, trade names. Drug prescription.	2
	Tasks (if available)	
	Literature: B. Katzung &. Basic and clinic pharmacology 2018 LANGE, P.1-88	
2.	**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
	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
	Tasks (if available)	
	Literature: B. Katzung &. Basic and clinic pharmacology 2018 LANGE P.1-88	
	IWST: consultation for the implementation of the IWS	1
3.	**Lecture** Pharmacodynamics. Receptors. Principles of interaction between human bodies and drugs. Different mechanisms of action –	2

	agonism and antagonism to different types and subtypes of receptors, inhibition of enzymes, blocking or opening of channels.	
	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
	Tasks (if available)	
	Literature: B. Katzung &. Basic and clinic pharmacology 2018 LANGE P.1-88	
	IWST: consultation for the implementation of the IWS	1
4.	**Lecture** PNS. Cholinergic drugs. Acetylcholine, it's effects on healthy human body. M and N cholinoreceptors, different subtypes. cholinomimetics. Cholinesterase inhibitors.	2
	Practical lesson PNS. Cholinergic drugs.Acetylcholine, it's effects on healthy human body. M and N cholinoreceptors, different subtypes. cholinomimetics. Cholinesterase inhibitors.	2
	Tasks (if available)	
	Literature: B. Katzung &. Basic and clinic pharmacology 2018 LANGE P.89-172	
	IWST: consultation for the implementation of the IWS	1
5.	**Lecture** PNS. Cholinergic drugs. Cholinoblockers. Cholinesterase reactivators	2
	Practical lesson Cholinergic drugs. Cholinoblockers, Cholinesterase reactivators	2
	Tasks (if available)	
	Literature: B. Katzung &. Basic and clinic pharmacology 2018 LANGE P.89-172	
	IWST: consultation for the implementation of the IWS	1
6.	**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
	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
	Tasks (if available)	
	Literature: B. Katzung &. Basic and clinic pharmacology 2018 LANGE P.89-172	
	IWST: consultation for the implementation of the IWS	1
7.	**Lecture** Adrenoblockers. Alfa beta adrenoceptor antagonists, Sympatholytics	2
	Practical lesson Colloquium 1 Adrenoblockers. Alfa beta adrenoceptor antagonists, Sympatholytics	2
	Tasks (if available)	
	Literature: B. Katzung &. Basic and clinic pharmacology 2018 LANGE P.89-172	
	IWST: delivery of IWS "Pharmacology Nowadays". Contemporary Medical Treatment approaches to actual diseases.	3
	Interim examination 1	
8.	**Lecture** CVD, Diuretics, Ca blockers, Nitrates, ACEI	2

	Practical lesson CVD, Diuretics, Ca blockers, Nitrates, ACEI	2
	Tasks (if available)	
	Literature: B. Katzung &. Basic and clinic pharmacology 2018 LANGE P.173-275, P.591-625	
	IWST: consultation for the implementation of the IWS	2
9.	**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
	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
	Tasks (if available)	
	Literature: B. Katzung &. Basic and clinic pharmacology 2018 LANGE P.173-275, P.591-625	
	IWST: consultation for the implementation of the IWS	2
10.	**Lecture** Diabetes	2
	Practical lesson. Diabetes	2
	Tasks (if available)	
	Literature: B. Katzung &. Basic and clinic pharmacology 2018 LANGE P.747-771	
	IWST: consultation for the implementation of the IWS	2
11.	**Lecture** Anti-inflammatory drugs. Signs of inflammation. inflammatory mechanisms.	2
	Practical lesson Anti-inflammatory drugs. Signs of inflammation. inflammatory mechanisms.	2
	Tasks (if available)	
	Literature: B. Katzung &. Basic and clinic pharmacology 2018 LANGE P.642-666, P.553-590, P.703-719	
	IWST: consultation for the implementation of the IWS	2
12.	**Lecture** Opioid system. Opioid agonists and antagonists. addiction.	2
	Practical lesson Opioid system. Opioid agonists and antagonists. addiction.	2
	Tasks (if available)	
	Literature: B. Katzung &. Basic and clinic pharmacology 2018 LANGE P.642-666, P.553-590, P.703-719	
	IWST: consultation for the implementation of the IWS	2
13.	**Lecture** Antibiotics. Principles of antimicrobial therapy. Mechanisms of formation, prevention and overcoming of resistance. beta-lactams, Macrolides, Tetracyclines, Aminoglycosides.	2
	Practical lesson Antibiotics. Principles of antimicrobial therapy. Mechanisms of formation, prevention and overcoming of resistance. beta-lactams, Macrolides, Tetracyclines, Aminoglycosides.	2
	Tasks (if available)	
	Literature: B. Katzung &. Basic and clinic pharmacology 2018 LANGE P.793-854, P.904-916, P.928-930	
	IWST: consultation for the implementation of the IWS	1
14.	**Lecture**	2

	Antibiotics. Peptide antibiotics. Nitroimidazoles and nitrofurans. fluoroquinolones. Linezolid. Sulfonamides. Trimethoprim.TB.	
	Practical lesson Antibiotics. Peptide antibiotics. Nitroimidazoles and nitrofurans. fluoroquinolones. Linezolid. Sulfonamides. Trimethoprim.TB.	2
	Tasks (if available)	
	Literature: B. Katzung &. Basic and clinic pharmacology 2018 LANGE P.793-854, P.904-916, P.928-930	
15.	**Lecture** Antiviral drugs. Treatment of HIV infection. Antifungals	2
	Practical lesson. Antiviral drugs. Treatment of HIV infection. Antifungals Colloquium 2	2
	Tasks (if available)	
	Literature: B. Katzung &. Basic and clinic pharmacology 2018 LANGE P.853-894	
	IWST: delivery of IWS "Pharmacology Nowadays". Contemporary Medical Treatment approaches to actual diseases.	1
	Interim examination 2	
All		**200**
9.	**Teaching methods in the discipline*** Lecture, mini-lecture, case-based lecture, case based learning (CBL) - individual, group, project method (individual, group), discussion, solving typical/situational tasks.	
10.	**Methods of formative assessment:** quiz, test, interactive test, self-assessment test, reflexive essay, mutual assessment/reviewing/commenting, etc. enter your assessment methods)	
11.	**Methods of summative assessment:** The course is planned to hold 2 controls (1 interim, 1 midterm examination) in each discipline: medical genetics, microbiology and pharmacology. For the semester, admission to the final exam rating points: AR = (IE1 + IE2) / 2, where IE1 / IE2 = the sum of all points for classes + points for interim and IWS of the corresponding period*. IE1 - 1-7 weeks, IE2- 8-15 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, IWS – independent work of students Methods :final/group MCQ, open tests, interactive test, TBL, CBL, OSPE (objective structured practical exam), oral survey, individual project/case, quiz, laboratory work	
10.	**Summative assessment (specify the estimates)**	

№	**Type of educational activity**	**Date**	**Score**	**%**
1	Lecture	According to the schedule	-	Not evaluated by points
2	Practical lesson 1. Discussion 2. solving typical/situational tasks.	According to the schedule	Assessment by checklist*	39%
3	IWST1	According to the schedule	Assessment by checklist	4.5 % of the CC1 score
4	IWST1	According to the schedule	Assessment by checklist	4.5 % of the CC2 score
5	CC1	7-th week	Assessment by checklist (Microbiology 30%, Pharmacology 40%, Genetic 30%)*	27.5 % of the final score
6	CC2	15th week	Assessment by checklist (Microbiology 30%,	24.5 % of the final score

			Pharmacology 40%, Genetic 30%)*	
7	Exam	According to the session schedule	100 points: 1 part - 30 points 2 part – 40 points 3 part –30 points	40 % of the final score
Final mark: AVG 60% + Exam 40%				

*Assessment by checklist (Microbiology 30%, Pharmacology 40%, Genetics 30%)

Evaluation of practical lesson Pharmacology;

1. **Written work**

	%
Составление рецепта	20
Определение фармакологической группы и фарм. эффектов	20
Механизм действия тканевой и молекулярный	20
Применение, побочные эффекты	20
Противопоказания, взаимодействие	20
	100%

2. **Group work (Team based learning – TBL)**

	%
Индивидуальный -- (IRAT)	30
Групповой -- (GRAT)	10
Апелляция	10
Оценка за кейсы -	20
Оценка товарищей (бонус)	10
	100%

3. Solving Case

Criteria		Level (point)				
	Out of program m	**At the levell of the Programm**	**Not complete answer**	**Need correction**	**need to study more**	**no pass**
answer for 1 qest, related to the determining medicine	30	30	20	15	10	0
Mechanism of action of the drug (some effect)	30	25	20	15	10	0
Comparison the drug with other medicines	40	35	25	20	15	0
	100	**90**	**65**	**50**	**35**	**0**
Prescription	40	35	25	20	15	0
Prescription	30	27	20	15	10	0
Prescription	30	28	20	15	10	0

final	**100**	**90**	**65**	**50**	**35**	**0**

Evaluation of cases Genetics

Question	**Criteria**	**Level (point)**					
		Out of program m	**At the level of the Programm**	**Not complete answer**	**Need correction**	**need to study more**	**no pass**
1	Describe the mechanism of mutation	10	9	7	5	3	0
2	Explain diagnostic methods	10	9	7	5	3	0
3	Propose methods of treatment	10	9	7	5	3	0
Total		**30**	**36**	**26**	**20**	**14**	**0**

Evaluation case Microbiology

Questions	Criteria		Level (point)				
		Out of programm	**At the levell of the Programm**	**Not complete answer**	**Need correction**	**need to study more**	**no pass**
Task 1	Can answer name the possible pathogen	30	30	20	15	10	0
Case	Can answer which lab. analysis can be carried out	30	25	20	15	10	0
	Can explain treatment and prevention	40	35	25	20	15	0
		100	**90**	**65**	**50**	**35**	**0**

10.	**Score**		
Rating by letter system	**Digital equivalent**	**Scores (%)**	**Description of the score**
A	4,0	95-100	**Great.** Exceeds the highest task standards.
A-	3,67	90-94	**Great.** Meets the highest standards of the assignment.
B+	3,33	85-89	**Good.** Very good. Meets the high standards of the assignment.
B	3,0	80-84	**Good.** Meets most of the job standards.

B-	2,67	75-79	**Good.** More than enough. Shows some reasonable ownership of the material.
C+	2,33	70-74	**Good.** Acceptable. Meets the basic standards of the task.
C	2,0	65-69	**Satisfactory**. Acceptable. Meets some basic job standards.
C-	1,67	60-64	**Satisfactory.** Acceptable. Meets some basic job standards.
D+	1,33	55-59	**Satisfactory.** Minimally acceptable.
D	1,0	50-54	**Satisfactory.** Minimally acceptable. The lowest level of knowledge and completion of the task.
FX	0,5	25-49	**Unsatisfactory.** Minimally acceptable.
F	0	0-24	**Unsatisfactory.** Very low productivity.

11.	**Information resources**
Literature	**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. 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
Electronic resources (including, but not limited to: electronic library catalog, databases of scientific literature, databases, animation, modeling, professional blogs, websites, other electronic reference materials (for example, video, audio, digests)	**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
Laboratory physical resources	-
Special software	1)Google Classroom 2)Kahoot Quiz

12.	**Teacher's expectations from students**
Student - attends all classes and lectures - actively participates in classroom classes during formative assessment, in group work, - performs tasks on time - shows respect to teachers, university staff and students - carefully handles the property of the Higher School of Medicine (dummies, desks, chairs, etc.) - keeps the campus and classrooms clean and tidy - uses gadgets in class only with the permission of the teacher - for all questions within the discipline, he addresses the teacher of this discipline, for general academic issues – to his supervisor - the correspondence is carried out only through a messenger approved by the teacher, at the time regulated by the teacher	

13.	**Discipline policy**
	Discipline policy is determined by the University's Academic Policy and the University's Academic Integrity Policy. If the links do not open, then you can find the relevant documents in IS Univer. Discipline: 1.It is not allowed to be late for classes or the morning conference. In case of being late, the decision on admission to the lesson is made by the teacher leading the lesson. If there is a good reason, inform the teacher about the delay and the reason by message or by phone. After the third delay, the student writes an explanatory note addressed to the head of the department indicating the reasons for being late and is sent to the dean's office to obtain admission to the lesson. If you are late without a valid reason, the teacher has the right to deduct points from the current grade (1 point for each minute of delay) 2.Religious events, holidays, etc. are not a valid reason for skipping, being late and distracting the teacher and the group from work during classes. 3.If you are late for a good reason - do not distract the group and the teacher from the lesson and quietly go to your place. 4.Leaving the class before the scheduled time, being outside the workplace during school hours is regarded as absenteeism. 5.Additional work of students during study hours (during practical classes and shifts) is not allowed. 6.For students who have more than 3 passes without notifying the curator and a good reason, a report is issued with a recommendation for expulsion. 7.Missed classes are not made up. 8.Students are fully subject to the internal regulations of the clinical bases of the department 9.Greet the teacher and any older person by standing up (in class) 10.Smoking (including the use of vapes, electronic cigarettes) is strictly prohibited on the territory of the medical institution (out-doors) and the university. Punishment - up to the annulment of boundary control, in case of repeated violation - the decision on admission to classes is made by the head of the department 11.Respectful attitude towards colleagues regardless of gender, age, nationality, religion, sexual orientation.

	12.Have a laptop / laptop / tab / tablet with you for training and passing MCQ tests for TBL, boundary and final controls. 13.Taking MCQ tests on phones and smartphones is strictly prohibited. The behavior of the student at the exams is regulated by the "Rules for the final control", "Instructions for the final control of the autumn/spring semester of the current academic year" (the current documents are uploaded to the Univer IS and are updated before the start of the session); "Regulations on checking text documents of students for the presence of borrowings."
14.	**Principles of inclusive learning**
	1. Constantly prepares for classes: For example, supports statements with appropriate links, makes short summaries Demonstrates effective learning skills, helps in teaching others **2. Take responsibility for your training:** For example, manages your training plan, actively tries to improve, critically evaluates information resources **3. Actively participate in the group's training:** For example, actively participates in the discussion, willingly takes assignments **4. Demonstrate effective group skills** For example, he takes the initiative, shows respect and correctness towards others, helps to resolve misunderstandings and conflicts **5. Skillful communication skills with peers:** For example, he listens actively, is receptive to nonverbal and emotional signals Respectful attitude **6. Highly developed professional skills:** Strives to complete tasks, looking for opportunities for more training, confident and qualified Compliance with ethics and deontology in relation to patients and medical staff Insubordination. **7. High introspection:** For example, he recognizes the limitations of his knowledge or abilities, without becoming defensive or reproaching others **8. Highly developed critical thinking:** For example, accordingly demonstrates skills in performing key tasks, such as generating hypotheses, applying knowledge to cases from practice, critically evaluating information, making conclusions aloud, explaining the process of reflection **9. Fully complies with the rules of academic behavior with understanding, offers improvements in order to increase efficiency.** Observes the ethics of communication – both oral and written (in chats and appeals) **10. Fully complies with the rules with full understanding of them, encourages other members of the group to adhere to the rules.** Strictly adheres to the principles of medical ethics and PRIMUM NON NOCER
15.	**Distance / online learning**
Distance / online learning is implemented at the University in accordance with the order of the Minister of Education and Science of the Republic of Kazakhstan dated March 20, 2015 No. 137 “On approval of requirements for educational organizations to provide distance learning and the rules for organizing the educational process for distance learning and in the form of online learning in educational programs of higher and (or) postgraduate education”; in accordance with the Rules for organizing training with the use of DOT at the University; Instructions for the final control of the autumn / spring semester of the current academic year (the current document is in the Univer IS); "Regulations on checking text documents of students for the presence of borrowings."	
16.	**Approval and review**

Head of the department	Signature	Sarsenova L.K.
Committee on the Quality of Teaching and Learning of the Faculty	Protocol №	Date of approval 01.09.2023
Dean of the Faculty	signature	Isayeva R.B.

- Assessment by checklist (Microbiology 30%, Pharmacology 40%, Genetic 30%)

Writing and presenting your research Thesis (maximum evaluation weight in 9 points which is 4.5% from 100% MT)

For SIW you have to work in groups that you usually study with (10-12 students in each group). You need to find articles to research a particular topic (e.g. one of antibiotic resistance) (at least one article per student), and summarize all of the information from those papers into one **thesis**. Potential topics that you can choose listed in the table (Attachment 2). Everyone's contribution is crucial because everyone has to fill in the table in the attachment. It is one table per group, where each student brings in at least 1 paper that he/she researched and includes the main points from there such as:

- Topic
- Author, journal
- Hypotheses
- Methodology and materials
- Results
- Conclusion

Use Google scholar (https://scholar.google.com/) to search for reliable scientific papers. SIW table must be submitted on the 4th week of the respective MT **no later than Monday 12.00**. Your thesis **must not exceed 1000 words** including a reference list (approximately 2 pages).
An anti-plagiarism tool will be used. The acceptable percentage of plagiarism report in a research paper is **not more than 25% of similarity.**

The five best theses will be accepted for further presentation sessions, which will be held on 1 week before MT week,. There will be the following mark categories:

- **90 – 100%** for five selected groups who presented their thesis
- **50 – 80%** for other works
- **0%** Works that could not pass the anti-plagiarism test

This assignment will account for **9 marks** of the course mark
Assessment criteria for thesis and table (See attachment 3 for more details):

- Respond to or initiate research and clarify or determine what knowledge is required, heeding ethical/cultural and social/team considerations.
- Find and generate needed information/data using appropriate methodology.
- Determine and critique the degree of credibility of selected sources and of data generated, and reflect on the research processes used.
- Organise information and data to reveal patterns and themes, and manage teams and research processes.
- Analyse information/data critically and synthesise new knowledge to produce coherent individual/team understandings
- Write, present and perform the processes, understandings and applications of the research, and respond to feedback, accounting for ethical, social and cultural (ESC) issues.
- Inclusion of references and links to scientific papers, original sources that the reader can explore to follow up and understand your thesis.

Reference

1. www.pharmgkb.org/vips
2. Goodman and Gilman Basics of Therapeutics 2010, 2018
3. Pubmed. Ncbi
4. https://www.pharmgkb.org/vips

5. elibrary.kaznu.kz

Assessment criteria for presentation:

Level of Achievement	**Excellent**	**Good**	**Marginal**	**Inadequate**
Organization	• Well thought out with logical progression • Use of proper language • Significance clearly stated • Content level appropriate for audience • Abstract and bibliography are well constructed	• Talk easy to follow • Use of proper language • Significance clearly stated • Content level not always appropriate • Abstract and/or bibliography have some errors	• Talk somewhat disorganized • Shows some effort to use proper language • Significance somewhat unclear • Includes some irrelevant content and inappropriate content level • Abstract and bibliography are not well constructed	• Talk difficult to follow • Unclear language • Does not understand significance of work • Inadequate content • Abstract and bibliography lack proper content and construction
Understanding of Scientific Content	• Identifies the research question/research field • Has advanced understanding of the experimental approach and significance • Critically evaluates results, methodology and conclusions • Scientifically rigorous and well researched	• Identifies the research question/research field • Has basic understanding of the experimental approach and significance • Limited evaluation of results, methodology and conclusions • Well researched	• Research question/research field somewhat unclear • Description of experimental approach somewhat confusing • Results and conclusions stated but not critically evaluated • Does not integrate outside readings	• Does not understand the research • Does not understand the experimental approach • Does not understand conclusions or recognize implications for future work
Style/Delivery	• Uses time wisely • Speaks with good pacing and enthusiasm • Makes eye contact and does not read information • Uses engaging tone and appropriate vocabulary	• Speaks well, but often repeats comments • Exhibits few disfluencies (“ahs”, “uhms”, etc.) • Makes eye contact • Uses good vocabulary and tone	• Presentation poorly timed • Some hesitation and uncertainty are apparent • Exhibits many disfluencies • Makes little eye contact and looks at notes • Monotone and nonengaging delivery	• Presentation poorly timed • Makes no eye contact and reads from notes • Hesitation and uncertainty are very apparent • Speaks too quietly or quickly for audience to hear and understand

Use of Visual Aids	• Tables/graphs summarize data and/or conclusions • Size and labels are clear • Very little text • Figures and images explained and described well • Presentation has no misspellings or grammatical errors • Makes limited and effective use of laser pointer • AV set up properly	• Text appropriately sized • Very little text • Most figures and images explained and described well • Presentation has an occasional misspelling or grammatical error • Uses laser pointer effectively • AV set up properly	• Labels and legends somewhat unclear • Text size somewhat small • Too much detail on slides • Blocks of text on slides • Figures are explained • Presentation has multiple misspellings and/or grammatical errors • Uses laser pointer unnecessarily • AV mishaps resolved	• Labeling is not clear • Size is too small to see • No logical placement of information • Mostly text and very few images • Figures are not explained • Presentation has numerous misspellings and/or grammatical errors • Use of laser pointer is distracting • AV mishaps unresolved
Ability to Answer Questions	• Anticipates audience questions • Understands audience questions • Can integrate knowledge to answer questions • Thoroughly responds to questions	• Does not anticipate audience questions • Understands audience questions • Can integrate knowledge to answer questions • Thoroughly responds to most questions	• Does not anticipate audience questions • Makes an effort to address question • Can address some questions • Often responds poorly to questions	• Either makes no effort to respond to questions or does so poorly

Attachment 1 for filling the table 1 for 1 group (12-15 student filling same table in google shared document)

N	**Student's name**	**Authors Name**	**Topic of Reference or paper, journal were it was published, year of publication, quartile**	**Hypotheses of research**	**Methods**	**Results**	**Conclusion**	**Citation**

Keywords on potential topics to choose

Gene	Drugs	Effect of polymorphisms on drugs efficiency	Antibiotics or related infections/
CYP2D6	Amitriptyline, atomoxetine, bufuralol, bupranolol, carvedilol, chlorpheniramine, chlorpromazine, clomipramine, clozapine, codeine, debrisoquine, desipramine, dextromethorphan, dihydrocodeine, encainide, flecainide, fluoxetine, fluvox- amine, guanoxan, haloperidol, hydrocodone, imipramine, maprotiline, 4–methoxy-amphetamine, metoclopramide, metoprolol, mexiletine, nebivolol, nortriptyline, oxycodone, palonosetron, paroxetine, perhexiline, perphenazine, phen- formin, propafenone, propoxyphene, propranolol, risperi- done, selegiline (deprenyl), sparteine, tamoxifen, thioridazine, timolol, tolterodine, tricyclic antidepressants, tramadol, trazodone, venlafaxine		
CYP2C9	Alosetron, bosentan, celecoxib, chlorpropamide, diclofenac, dronabinol, flurbiprofen, fluvastatin, glimepiride, glipizide, glyburide, hexobarbital, ibuprofen, indomethacin, irbesartan, losartan, meloxicam, montelukast, naproxen, nateglinide, phenobarbital, phenytoin, piroxicam, rosiglitazone, rosuvastatin, sulfamethoxazole, sulfaphenazole, ticrynafen, tolbutamide, torsemide, trimethadione, valsartan, *S*-warfarin		sulfamethoxazole,
Glucose 6 phosphate dehydrogenase	салицилаты		
BCHE			
P2RY12 PGx	ADP induced agregation		
KCNJ11 PGx	sulfonylureas		sulfonylureas
CYP2E1	Acetaminophen, chlorzoxazone, dacarbazine, enflurane, ethanol (a minor pathway), halothane, isoflurane, isoniazid, sevoflurane, theophylline, trimethadione		isoniazid,
CYP1A2 PGx	caffeine and antipsychotics.		

ACE PGx	ace inhibitors		
ADRB1 PG	G-protein-coupled receptor expressed in cardiac tissue		
ADRB2 PGx	beta-2-adrenergic receptor		
CACNA1S PG	L-type calcium channel		

What characterises the difference between 'search' and 'research'? More searching and more data generation is just a 'biggasearch'! Research is **when students...**		**Level 1 (Prescribed Research)** Highly structured directions and modelling from educator prompt student research	**Level 2 (Bounded Research)** Boundaries set by and limited directions from educator channel student research	**Level 3 (Scaffolded Research)** Scaffolds placed by educator shape student independent research	**Level 4 (Student-initiated Research)** Students initiate the research and this is guided by the educator	**Level 5 (Open Research)** Students research within self-determined guidelines that are in accord with discipline or context.
a. Embark & Clarify Respond to or initiate research and clarify or determine what knowledge is required, heeding ethical/cultural and social/team considerations.	Curious	Respond to questions/tasks arising explicitly from a closed inquiry. Use a provided structured approach to clarify questions, terms, requirements and expectations.	Respond to questions/tasks required by and implicit in a closed inquiry. Choose from several provided structures to clarify questions, terms, requirements and expectations.	Respond to questions/tasks generated from a closed inquiry. Choose from a range of provided structures or approaches to clarify questions, terms, requirements and expectations.	**Generate questions/aims/ hypotheses framed within structured guidelines*.*	**Generate questions/aims/ hypotheses based on experience, expertise and literature*.*
b. Find & Generate Find and generate needed information/data using appropriate methodology.	Determined	Collect and record required information or data using a prescribed methodology from a prescribed source in which the information/data is clearly evident.	Collect and record required information/data using a prescribed methodology from prescribed source/s in which the information/ data is not clearly evident.	Collect and record required information/data from self-selected sources using one of several prescribed methodologies.	Collect and record self-determined information/ data from self-selected sources, choosing an appropriate methodology based on structured guidelines.	Collect and record self-determined information/data from self-selected sources, choosing or devising an appropriate methodology with self-structured guidelines.
c. Evaluate & Reflect Determine and critique the degree of credibility of selected sources and of data generated, and reflect on the research processes used.	Discerning	Evaluate information/data and reflects on inquiry process using simple prescribed criteria.	Evaluate information/data and reflect on the inquiry process using given criteria.	Evaluate information/data and inquiry process using criteria related to the aims of the inquiry. Reflect insightfully to improve own processes used.	Evaluate information/data and the inquiry process comprehensively using self-determined criteria developed within structured guidelines. Reflect insightfully to refine others' processes.	Evaluate information/data and inquiry process rigorously using self-generated criteria based on experience, expertise and the literature. Reflect insightfully to renew others' processes.
d. Organise & Manage Organise information and data to reveal patterns and themes, and manage teams and research processes.	Harmonising	Organise information/data using prescribed structure. Manage linear process provided.	Organise information/data using a choice of given structures. Manage a process which has alternative pathways.	Organise information/data using recommended structures. Manage self-determined processes with multiple possible pathways.	Organise information/data using student-determined structures, and manage the processes, within the parameters set by the guidelines.	Organise information/data using student-determined structures and management of processes.
e. Analyse & Synthesise Analyse information/data critically and synthesise new knowledge to produce coherent individual/team understandings.	Creative	Analyse and synthesise information/data to reproduce existing knowledge in prescribed formats. **Ask emergent questions of clarification/curiosity*.*	Analyse and synthesise information/data to reorganize existing knowledge in standard formats. **Ask relevant, researchable questions emerging from the research*.*	Analyse and synthesise information/data to construct emergent knowledge. **Ask rigorous, researchable questions based on new understandings*.*	Analyse and create information/data to fill knowledge gaps stated by others.	Analyse and create information/data to fill student-identified gaps or extend knowledge.
f. Communicate and Apply Write, present and perform the processes, understandings and applications of the research, and respond to feedback, accounting for ethical, social and cultural (ESC) issues.	Constructive	Use mainly lay language and prescribed genre to demonstrate understanding for lecturer/ teacher as audience. Apply to a similar context the knowledge developed. Follow prompts on ESC issues.	Use some discipline-specific language and prescribed genre to demonstrate understanding from a stated perspective and for a specified audience. Apply to different contexts the knowledge developed. Specify ESC issues.	Use discipline-specific language and genres to demonstrate scholarly understanding for a specified audience. Apply the knowledge developed to diverse contexts. Specify ESC issues in initiating, conducting and communicating.	Use discipline-specific language and genres to address gaps of a self-selected audience. Apply innovatively the knowledge developed to a different context. Probe and specify ESC issues in each relevant context.	Use appropriate language and genre to extend the knowledge of a range of audiences. Apply innovatively the knowledge developed to multiple contexts. Probe and specify ESC issues that emerge broadly.