



SYLLABUS OF THE DISCIPLINE « GENETICS»

1. General information	
Faculty	Faculty of foreign students
Education Programme (Education sector, speciality, level of high education, form of study)	22 Public Healthcare, 222 Medicine, the 2 nd (master) level of high education, daytime study
Year	2023-2024
Discipline, code (<i>e-mail on the website of the Danylo Halytsky Lviv National Medical University</i>)	Genetics , ББ 1.29 Kaf_medicalbiology@meduniv.lviv.ua
Department (<i>name, adress, phone number, e-mail</i>)	Department of Medical Biology, Parasitology and Genetics 79010, Lviv, Pekarska str., 69 (Shimzeriv, 3 a) ph +380(32)275-49-66 <i>e-mail</i> Kaf_medicalbiology@meduniv.lviv.ua <i>e-mail</i> kaf_med_biol@ukr.net
Head of the Department (<i>e-mail</i>)	Vorobets Zinovij Dmytrovych, Doctor of Biological Sciences, Professor <i>e-mail</i> Kaf_medicalbiology@meduniv.lviv.ua
Academic year (<i>year, when the study of the discipline is realized</i>)	I course
Semester (<i>semester, when the study of the discipline is realized</i>)	I
Type of discipline (<i>obligatory / selective</i>)	Selective
Educators (<i>names, surnames, Scientific Degree and Academic Titles, e-mail</i>)	Paryzhak S.Ya. – Ph.D., Associate Professor; sola.paryzhak@gmail.com Onufrovych O.K. – Ph.D., Associate Professor onufrovychok@gmail.com
Erasmus yes/no (<i>availability of the discipline for students in framework of Erasmus+ program</i>)	No
Person, responsible for syllabus (<i>person, who is to be given comments concerning syllabus, contact e-mail</i>)	Olena Korchyńska – Ph.D., Associate Professor; olenakorchyńska@ukr.net Onufrovych O.K. – Ph.D., Associate Professor; onufrovychok@gmail.com
Quantity of ECTS credits	3
Quantity of hours (<i>lectures/ practical classes/ individual work</i>)	90 (<i>lectures – 12, practical classes – 18, individual work – 60</i>)

Language of Instruction	English
Information about consultations	According to the schedule
2. Brief review of the subject	
<p>The discipline «Genetics» (elective course) is a component of the educational-professional program, studied by students of speciality 222 «Medicine» of the first year of study.</p> <p>The course is based on previously studied by students in secondary school subjects such as «General Biology», is integrated with the discipline «Medical Biology». The rapid development of medical genetics has been made possible by the development of embryology, human anatomy and physiology, cytology, biochemistry and classical genetics. The realization of the international project "Human Genome" has led to the fact that today man is one of the best studied objects of molecular genetics. In a short time, genetic diagnosis and gene therapy of many hereditary anomalies, which until recently were considered incurable, became possible. This determines the relevance of in-depth study of general genetics and medical genetics in particular.</p> <p>Knowledge of the basics of medical genetics are necessary to understand the basic principle that any human pathology is to some extent related to heredity. The discipline provides general biological training for the study of modern problems and achievements of genetics, including molecular genetic diagnostics, pharmacology, gene therapy. Teaching the discipline includes lectures, practical classes, independent work of students and ends with a test. «Genetics» (elective course) lays the foundation for further mastering by students of knowledge and skills in specialized theoretical and clinical professional and practical disciplines (bioorganic chemistry, pharmacology, physiology, medical genetics, clinical immunology, infectious diseases, pediatrics, etc.).</p>	
3. Aim and goals of the subject	
<p>1. The aim and objectives of the academic discipline.</p> <p>1.1. Ultimate goals of educational discipline «Genetics» (elective course) is the formation of knowledge and practical skills for further study by students disciplines which provide natural-scientific and professionally practical preparation to master modern problems and achievements of molecular medicine.</p> <p>1.2. The ultimate goals of educational discipline are:</p> <ul style="list-style-type: none"> • To explain regularities of the vital functions of organism of a man at the molecular-genetic and cellular levels; • To determine the displays of action of general biological laws in ontogenesis of man; • To understand the molecular-genetic basis for the development of hereditary and multifactorial diseases and prospects for the application of the achievements of molecular biology in practical medicine. <p>. Competencies and studying process results:</p> <p>General (3K):</p> <p>3K 1. Ability to abstract thinking, analysis and synthesis.</p> <p>3K 2. Ability to learn and acquire modern knowledge</p> <p>3K 3. The ability to apply the acquired knowledge in their practice.</p> <p>3K 4. Knowledge and understanding of the subject. Understanding of the professional activity.</p> <p>3K 5. Ability to adapt and act in a new situation.</p> <p>3K 6. Ability to make informed decisions.</p> <p>3K 7. Ability to work in a team.</p> <p>3K 8. Interpersonal skills interaction.</p> <p>3K 9. Ability to communicate in the state language both orally and in writing.</p> <p>3K 10. Skills in the use of information and communication technologies.</p> <p>3K 11. Ability to search, process and analyze information from various sources.</p> <p>3K 12. Definiteness and perseverance in terms of tasks and responsibilities.</p> <p>3K 13. The ability to act socially responsibly and consciously.</p>	

3K 14. The ability to exercise their rights and responsibilities as a member of society, to realize the values of civil (free democratic) society and the need for its sustainable development, the rule of law, human and civil rights and freedoms in Ukraine.

3K 15. The ability to preserve and multiply moral, cultural, scientific values and achievements of society based on understanding the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society and in the development.

Special (ФК):

ФК 2. The ability to interpret the results of laboratory and instrumental research.

ФК 13. Ability to assess the impact of the environment on the health of the population (individual, family, population).

ФК 17. Ability to assess the impact of the environment, social, economical and biological determinants on the health of human, children, families and populations.

ФК 21. Communicate one's own knowledge, conclusions and arguments on health care problems and related issues to specialists and non-specialists, in particular to people who are studying, clearly and unambiguously.

ФК 24. Adherence to ethical principles when working with patients and laboratory animals.

ФК 25. Adherence to professional and academic integrity, to be responsible for the reliability of the obtained scientific results.

4. Preliminary requirements

For successful learning and gaining necessary competencies in the discipline being studied, fundamental knowledge of biology (such subjects as "General Biology", "Human Biology", in accordance with State standard for basic general secondary education is advisable.

5. Program learning results

List of the learning results		
Code of education results	Essence of education results	Matrix of competencies
<i>The code is created when filling the syllabus (category: 3H - knowledge, YM - ability, K - competence, AB - autonomy and responsibility)</i>		Symbol of the Program Learning Outcome Code in the Higher Education Standard
<i>3H-1</i>	To know and use in the practice of the doctor knowledge of the molecular basis of heredity, the mechanisms of development of hereditary and acquired human diseases.	<i>ППП - 1 -2, 19, 21, 23, 25, 27</i>
<i>3H-2</i>	To know the peculiarities of human ontogenesis in diagnosis and treatment of various human diseases.	
<i>3H-3</i>	Know and understand modern achievements in molecular biology.	
<i>3H-4</i>	To know how to use own professional activities for the environment protection.	
<i>YM-1</i>	Be able to determine the primary structure of the protein, the number of amino acids, the molecular weight of the polypeptide by the nucleotide sequence of the gene.	

	Be able to determine the type of gene, chromosomal and genomic mutations	
<i>Y_{M-2}</i>	Be able to analyze the electropherogram of DNA and determine the presence of DNA of causative agents of infectious diseases, mutations in human genes	
<i>Y_{M-3}</i>	Be able to explain to the patient and his family the main causes of mutations and their connection with hereditary diseases.	
<i>Y_{M-4}</i>	To form the requirements of environment protection	
<i>K-1</i>	To apply in practical activity of the doctor knowledge of molecular and cytological bases of heredity, mechanisms of development of hereditary and acquired diseases.	
<i>K-2</i>	To apply knowledge of the peculiarities of human ontogenesis and its connection with phylogenesis in the diagnosis and treatment of human diseases.	
<i>K-3</i>	Be able to explain to the patient and his family the molecular-biological basis of the appliance of use of stem cells,s, the biological basis of aging.	
<i>K-4</i>	To estimate the impact of environmental factors on human health, use their professional activities for the environment protection.	
<i>AB-1</i>	Be responsible for mastering the relevant knowledge and skills.	
<i>AB-2</i>	To manifest responsible attitude and care for the environment.	
	Program learning outcomes (IPPH)	
<i>IPPH - 1</i>	Have thorough knowledge of the structure of professional activity. To be able to carry out professional activities that require updating and integration of knowledge. To be responsible for professional development, the ability for further professional training with a high level of autonomy.	
<i>IPPH - 2</i>	Understanding and knowledge of basic and clinical biomedical sciences, at a level sufficient for solving professional tasks in the field of health care.	
<i>IPPH -19</i>	Plan and implement a system of anti-epidemic and preventive measures regarding the occurrence and spread of diseases among the population.	
<i>IPPH - 21</i>	Search for the necessary information in the professional literature and databases of other sources, analyze, evaluate and apply this information.	
<i>IPPH - 23</i>	To assess the impact of the environment on human health in order to assess the morbidity of the population.	
<i>IPPH - 25</i>	To communicate one's own knowledge, conclusions and arguments on health care problems and related issues to specialists and non-specialists in a clear and unambiguous manner.	

IPPH - 27	IPPH 27. communicate fluently in the national and English languages, both orally and in writing to discuss professional activities, research and projects.			
6. Course content				
Discipline format (<i>day-time, or extramural</i>)	Day-time			
Classes	Hours		Quantity of groups	
lectures	12		4	
practical classes	18		4	
seminars	-		-	
individual works	60		4	
7. Topic content of the course				
Code of class	Topic	Content	Code of education results	Викладач
Л-1 (<i>lecture-1</i>)	Subject and tasks of medical and molecular genetics. Subject and tasks of molecular genetics. Molecular mechanisms of intercellular signaling and transmembrane transport	To consider the subject and tasks of medical and molecular genetics, its importance for the diagnosis and prevention of hereditary human diseases.	ЗН-1, АВ-1, К-1	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
Л-2	Mutations as the main etiological factor in the development of hereditary pathology	Consider the main types of mutations by level and place of origin Find out the importance of mutations in the development of inherited human diseases.	ЗН-2, УМ-1, 2, К-1, АВ-1	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
Л-3	Peculiarities of the human mitochondrial genome..	Mitochondrial diseases are heterogeneous group of diseases, which is caused by genetic, structural, biochemical defects of mitochondria and tissue respiration disorders from which the whole organism suffers	ЗН-4, К-2,К-4 АВ-2	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
Л-4	Hereditary diseases: classification, mechanisms of occurrence.	To acquaint students with the basic concepts and classifications of hereditary diseases. Describe the mechanisms of their occurrence. To draw students' attention to the	ЗН-2, ЗН-3 К-2	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.

		general characteristics of the genes involved in carcinogenesis.		
Л-5	Methods of human inheritance investigation..	Consider the basic research methods used by medical genetics. Practical use of methods in clinic.	3H-2, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
Л-6	Medical and genetic counseling and prenatal diagnosis.	Discuss with students ways and types of prevention of hereditary diseases. To study the methods of medical and genetic counseling, the principles of assessment of genetic development in various pathologies. Also find out the general indications for the diagnosis of diseases.	3H-3, K-3, AB-1	
П-1 (<i>practical class 1</i>)	General characteristics of monogenic pathology. Genetics of some forms of monogenic diseases.	Consider the classification of monogenic diseases: enzymopathy, defects of structural proteins, disorders of circulating blood proteins, genetic diseases with a biochemical defect.	3H-1, 3H-2, УМ-1, УМ-2, K-1, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
П-2	Amino acid metabolism disorders: phenylketonuria, homocystinuria, albinism and alkaptonuria. Types of inheritance, clinical signs and diagnosis.	Consider diseases that occur as a result of impaired amino acid metabolism. Clinical signs, diagnostic methods and prospects of overcoming clinical manifestations of diseases.	3H-2, 3H-3 УМ-2, K-1, K-3	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
П-3	Hereditary disorders of carbohydrate metabolism: galactosemia and glycogenosis. Pathogenesis and diagnosis.	Consider diseases that have arisen as a result of carbohydrate metabolism disorders. Clinical signs, diagnostic methods and prospects of overcoming clinical manifestations of diseases.	3H-2, 3H-3 УМ-2, K-1, K-3	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
П-4	Hereditary disorders of lipid metabolism. Diseases of Tay-Sachs, Neiman-Pick, Gaucher. Causes, clinical	Consider diseases that occur as a result of impaired lipid metabolism. Clinical signs, diagnostic methods and prospects of overcoming clinical manifestations of diseases.	3H-2, 3H-3 УМ-2, K-1, K-3	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.

	signs and diagnosis.			
II-5	General characteristics of human mitochondrial pathology. Clinic, diagnosis, treatment.	Consider the modern classification of mitochondrial diseases, which are characterized by the type of mutations. Clinic of the most common diseases and principles of treatment.	3H-2, УМ-2, К-1, АВ-1	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
II-6	Mutagens. Stages of mutagenesis. Drug mutagenesis, teratogenesis, carcinogenesis. Mutagenicity testing of substances.	Classification of gene mutations. The concept of monogenic hereditary diseases. Molecular and cytological mechanisms of chromosomal mutations. Classification of mutations. Generative and somatic mutations. Mutagenic factors, methods for determining the mutagenic activity of substances. Antimutagenesis	3H-4, УМ-4, К-4, АВ-2	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
II-7	General characteristics of multifactorial diseases. Determination of genetic predisposition. Prevention measures. Fundamentals of ecological genetics, pharmacogenetics .	Get acquainted with multifactorial diseases and features of proliferation of predisposition genes. Consider specific mechanisms for the implementation of hereditary predispositio	3H-2, 3H-3, УМ-3, К-1, АВ-1	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
II-8	Recombinant DNA methods, nucleic acids hybridization.	Genetic engineering and biotechnology. The concept of recombinant DNA. General characteristics of recombinant DNA methods. Methods of hybridization of nucleic acids. Polymerase chain reaction	3H -3, УМ -2, К-4, АВ -2	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
II-9	Levels and ways of prevention of hereditary diseases. Medical and genetic counseling and prenatal diagnosis.	Get acquainted with the levels, ways and types of prevention of hereditary diseases. To study the methods of medical and genetic counseling, principles and assessment of genetic risk in various pathologies.	3H-2, УМ-3, К-1, АВ-1	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.

CPC-1 (<i>individual work-1</i>)	Mobile genetic elements. Molecular mechanisms of general genetic recombination	In higher organisms, recombination is carried out by independent divergence of chromosomes during the process of meiosis, or by the exchange of sections of homologous (paired) chromosomes - crossover. This process leads to the formation of offspring genomes that receive different combinations of their parents' genes and may have new chimeric alleles.	3H-1, K-1	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
CPC-2	Extranuclear heredity. Mitochondrial genome	Principles of mitochondrial genome structure. Implementation of non-nuclear genetic information.	3H-2, K-1, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
CPC-3	Embryonic stem cells as a perspective therapeutic direction of treatment	Structure and functioning of embryonic stem cells. Their significance for embryogenesis.	3H-2, K-1, AB-1, AB-2	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
CPC-4	Genetic engineering and its methods	Cloning of nucleic acid fragments in vitro. Polymerase chain reaction. Molecular genetic research methods in forensic medicine.	3H-1, AB-1,	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
CPC-5	Transgenic organisms. The principle of construction of transgenic organisms	Basic methods and principles of construction of transgenic organisms	3H-3	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
CPC-6	Transgenic bacteria, plants and animals. The main areas of application in the national economy and medicine	Methods of obtaining transgenic bacteria. Application of transgenic organisms in the national economy and medicine.	3H-3, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
CPC-7	Gene therapy in oncology	Prospects and successes of using gene therapy in oncology	3H-4, K-3, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
CPC-8	Nucleic acid-based vaccines and their use in medicine	Transgenic animals as disease models and bioreactors. Problems of ecological safety.	3H-4, K-3, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.

		Gene therapy. Principles of gene therapy. Ex vivo and in vivo gene therapy. Viral and non-viral vectors in gene therapy. Prospects and limitations of gene therapy.		
CPC-9	Genome structure and general characteristics of human genes	Human Genome Project. Nuclear and mitochondrial genome. Features of the human genome. The main directions of research of the human genome: structural, functional, comparative, informative. Knowledge of the human genome opens new avenues in the diagnosis and treatment of hereditary human diseases.	3H-2, УМ-2, K-1	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
CPC-10	Oncogenetics. Diagnosis of hereditary predisposition to cancer	Carcinogenic factors, their classification. Carcinogens of direct and indirect action. Characteristics of genes involved in carcinogenesis: viral oncogenes, protooncogenes, tumor suppressor genes, mutator genes.	3H-4, УМ-4, K-4, AB-2	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
CPC-11	Cellular engineering. Cloning of organisms and cells	History of cloning of living organisms. Biological and ethical problems of cloning	3H-4, K-3, AB-2	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
CPC-12	Achievements of biotechnology in medicine	Methods of obtaining transgenic bacteria. Application of transgenic organisms in the national economy and medicine.	3H-3, AB-1	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
CPC-13	Congenital defects: classification, etiology, diagnosis and prophylaxis	Monogenic human diseases. Molecular mechanisms and classification of chromosomal mutations. Molecular mechanisms of genomic mutations. Human chromosomal diseases. The study of the classification of hereditary diseases is the basis for better early diagnosis of metabolic diseases and increases the possibility of correction of certain metabolic diseases through certain diets.	3H-4, УМ-4, K-4, AB-2	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.

CPC-14	Nanomedicine and implementation of its achievements in medical practice	Prospects and reality of the use of gene therapy in oncology. Gene therapy. Principles of gene therapy. Ex vivo and in vivo gene therapy. Viral and non-viral vectors in gene therapy. Prospects and limitations of gene therapy.	ЗН-4, УМ-4, К-4, АВ-2	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.
CPC-15	Levels and methods of prevention of hereditary diseases	Characteristics of multifactorial diseases: high frequency in the population; the nature of sex and age differences; features of the spread of predisposition genes and the prevalence of diseases in families.	ЗН-1-4, УМ-3, 4, К-3,4, АВ-1	Assoc. Prof. Paryzhak S.Ya., Assoc. Prof. Onufrovych O.K.

System of classes

- **information sources:** verbal and auditory perception methods of learning information (lecture, conversation, explanation, discussion); methods of presenting information and visual methods (illustration, demonstration of slides, tables, figures, review of literature; visual sources of information); methods of practical application of the information (practical assignment, practical tasks solving, mastering of practical skills).

- **according to individual work:** by means of problems, partial-searching, research (situational tasks solving, preparing scientific reports).

Interactive methods

-problem-oriental method

-method of individual educational-research and practical tasks

- method of competing groups

- method of training technologies

- «business game» method

- brainstorming method

8. Verification of results

Scoring system

Students are being tested and scored at each and every single class.

Criteria of evaluation:

Education al results code	Kind of class Code	Educational results verification methods	Criteria of passing
		Methods of control	
ЗН-1, ЗН-2, ЗН-3,	Л-1, Л-2, Л-3, Л-4, Л-5, Л-6	<p>Types of educational activities of students are:</p> <p>a) lectures</p> <p>b) practical classes</p> <p>c) individual work of student (CPC)</p> <p>Thematic plans of lectures, practical classes and individual work provide the discipline topics realization in educational process.</p> <p>Lecture course consists of 6 lectures. The course of lectures comprises all problematic issues of relevant chapters</p>	<p>Criteria for evaluation</p> <p>- Excellent ("5") – the student perfectly mastered the theoretical material of the topic, demonstrates deep and comprehensive knowledge of the topic, the main concepts of scientific sources and recommended literature,</p>

<p>3H-4, K-1, K-2, K-3, K-4, AB-1, AB-2</p> <p>3H-1, 3H-2, 3H-3, 3H-4, УМ-1, УМ-2, УМ-3, УМ-4, K-1, K-2, K-3, K-4, AB-1, AB-2</p>	<p>П-1, П-2, П-3, П-4, П-5, П-6, П-7, П-8, П-9</p> <p>CPC-1, CPC-2, CPC-3, CPC-4, CPC-5, CPC-6, CPC-7, CPC-8, CPC-9, CPC-10, CPC-11, CPC-12, CPC-13, CPC-14 CPC-15</p>	<p>of genetics. The lecture course is aimed at presenting basic knowledge of the discipline, motivate and orient the students. Didactic means – multimedia presentations, educational films, and slides are widely used during the lectures.</p> <p>Practical classes serve for checking the level of students understanding of theoretical material presented at lectures, and forming practical skills. They also urge the students to apply the acquired knowledge for solving practical tasks. Every lesson starts with control test for the assessment of the level of output student knowledge. The teacher formulates the aim of the lesson and creates the positive motivation; then answers the questions, which appeared during individual work.</p> <p>The main part of the lesson is dedicated to practical work. Students have practical access to macro- and micropreparations, solve typical situation tasks, problems from molecular biology, genetics and medical genetics, and draw pictures of the studied species in their students' personal albums.</p> <p>At the end of the lesson, the student is supposed to present their solutions of the situational tasks for the teacher to assess the level of their understanding.</p> <p>The teacher summarises the lesson, gives home assignment for individual work, points out the basic issues of next topic and gives the list of the recommended literature.</p> <p>The duration of the practical lesson is 2 academic hours.</p>	<p>thinks logically and answers thoroughly, freely uses the acquired theoretical knowledge in analyzing of practical material, expresses his attitude to certain problems, demonstrates high level of practical skills acquisition.</p> <p>- Good ("4") – the student has well mastered the theoretical material of the lesson, knows the basic aspects of primary sources and recommended literature; possess practical skills, expresses his views on certain issues, but assumes certain inaccuracies and errors in the logic of the presentation of theoretical content or in the implementation of practical skills.</p> <p>- Satisfactory ("3") – the student has mainly mastered the theoretical knowledge of the subject, is guided by primary sources and recommended literature, but answers unconvincingly, confuses concepts, additional questions cause the student uncertainty or lack of stable knowledge; answering questions of a practical nature, reveals inaccuracies in knowledge, is unable to assess facts and phenomena, relate them to future activities, makes</p>
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			<p>mistakes in the implementation of practical skills</p> <p>- Unsatisfactory ("2") – the student has not mastered the study material of the topic, does not know the scientific facts, definitions, almost does not navigate in the original sources and recommended literature, there is no scientific thinking, practical skills are not formed.</p>
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Current educational activity

Current control is performed during the studying classes and is aimed at checking the mastering by students the learning material. The forms of current control are:

- a) tests with a choice of one correct answer (multiple choice questions), the definition of the correct sequence of actions, definition of correspondency, the definition of specific areas in a picture or diagram («recognition»);
- b) individual oral examination, interview;
- c) solving of typical situational problems;
- d) solving of typical situational problems from genetics.

During the estimation of mastering of each topic for current educational activity student is graded in 4-point (traditional) scale according with the approved assessment criteria for the appropriate discipline. This takes into account all types of work, provided by the program of the discipline.

The traditional scores from discipline are converted to the points.

Individual work of students is estimated during current control topics at the proper lesson and is a part of the final grade of student.

The final control

General assessment system	Is performed after the discipline completion in the form of credit.	
Assessment scales	Traditional 4-point scale, 200-point scale, ECTS rating scale	
Requirements for final control access	The student attended all the practical lessons and received not less than 120 points.	
Type of the final control	Credit	Passing criteria. «зараховано» or «не зараховано»

Maximum quantity of points, which student can collect for the current educational activity for admission to the credit makes 200 points.

Minimum quantity of points, which student can collect for the current educational activity for admission to the credit makes 120 points.

The calculation of the number of points is made on the basis of the collected student's marks on the traditional scale during the discipline study, by calculating the arithmetic mean (AM or average), rounded to two decimal places. The obtained value is converted into points according to

the scoring scale as follows:

$$x = \frac{CA \times 200}{5}$$

The assessment of the discipline, the form of final control of which is a credit, is based on the results of the evaluation of current educational activities and is expressed on a two-point scale: "credited" or "not credited". To enroll in the discipline, the student should receive for the current educational activity not less than 60% of the maximum amount of points (for a 200-point scale - not less than 120 points). Points and grades ("credited" or "not credited") the teacher enters in the in the credit-examination sheet and in the student's credit book (except for the grade "not credited"). Points of the discipline are converted into the ECTS scale. Grade F (unsatisfactory with the required re-course) at day of the credit receive students who have attended all classes of the discipline, but did not score the minimum number of points for the current academic activity. Such students receive a grade of "not credited" and are not allowed to take the exam session.

Estimation of ECTS and traditional scale is not converted because the ECTS scale and 4-point scale are independent.

A", „B", „C", „D", „E" ranking is made for students studying at one of the specialty and who have successfully completed study course.

Points of discipline for students who have successfully completed the program are converted into traditional 4-point scale by absolute criteria, which are listed in the following table:

Points from discipline	Estimation on 4-point scale
From 170 to 200 points	5
From 140 to 169 points	4
From 139 points to minimal quantity of points, which student must collect	3
Less than minimal quantity of points, which student must collect	2

Objective evaluation of educational activities of students is tested by statistical methods (the correlation coefficient between ECTS score and score in a national scale).

9. Course policy

The course policy is determined by the requirements of the discipline learning «Genetics» and is based on academic integrity. The students are explained the value of the knowledge and necessity of thorough individual work and fulfill all the tasks included in the syllabus. The examples of inadequate integrity are: missing of references to the used sources, cheating, sources fabrication, interference in the work of other students. Any kind of unintegrity, no matter of its volume is unacceptable and results in poor academic mark. Sources that are recommended by the teacher may be used only for academic purposes and transfer this information to third parties is forbidden. Students are encouraged to use other literature sources not provided by the recommended list.

10. Literature

Basic:

1. Paryzhak S.Ya., Vorobets Z.D. Medical Biology. Textbook – Lviv: Qvart, 2020. – 426 p.
2. Bazhora Y.I., Bulyk R.Ye., Chesnokova M.M., Shevelenkova A.V., Smetyuk O.O., Lomakina Yu.V. Medical Biology: textbook. – Vinnytsia: Nova Knyha, 2018. – 448 p.: il.
3. Step 1. Lecture notes 2018 Biochemistry and Medical genetics. New York. Kaplan, Inc. – 2018 – 403 c.

Additional:

1. Kaplan Medical's USMLE STEP 1. Biochemistry and Medical Genetics. Lecture notes. – 2018. – 432 p.
2. Pap E., Falus A., László V., Oberfrank F., Szalai C., Tóth S. Medical Genetics and Genomics. Edited by Typotex Kiadó. – Budapest University of Technology and Economics, 2016. – 206 p.
3. **Informational resources:**
 1. Testing center – database of license tests Krok – 1 <http://testcentr.org.ua/>
 2. OMIM (Online Mendelian Inheritance in Man) – An Online Catalog of Human Genes and Genetic Disorders <http://omim.org/>

11. Equipment, hardware and software resources of the discipline/ course

Methodological support

- Syllabus from the discipline;
- Lecture thesis from the discipline;
- Methodical recommendations for teachers;
- Methodical recommendations for practical classes for students;
- MISA learning platform;
- Methodical manual for students independent work;
- Tests and control tasks for practical classes;
- Questions and tasks for final control.

12. Additional information

Responsible for the educational process at the department – Associate Professor O.I. Pershyn. Scientific students group is organized at the department. Meetings are held in the classroom №1. The address of the practical lessons is Lviv, Pekarska str., 69 (Shimzeriv, 3a), classrooms of Medical biology, parasitology and genetics department.
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Authors of syllabus,

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