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INTERNATIONAL EUROPEAN UNIVERSITY

SYLLABUS

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SCHOOL OF MEDICINE

MEDICAL BIOLOGY

2023

SYLLABUS

Course Name	MEDICAL BIOLOGY
Lecturer (s)	Mykhailo Mykhailiuk, associate professor at the Department of Fundamental, Medical and Preventive Disciplines; R.O. Pavlenko, lecturer
Lecturer's profile	https://medicine.ieu.edu.ua/pro-yemsh/kafedry/kafedra-fundamentalnykh-dystsyplin
Consultations	
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Discipline page	https://student.ieu.edu.ua/school-of-medicine/department-of-medicine- profilact-discipline

Form of final control	test	def. test	exam
	☐	☐	☒

SYLLABUS

1 Brief discipline annotation

Medical biology lays the foundation for further acquisition of program learning outcomes according to the Higher Education Standard of Ukraine of pre-graduate training of specialists of the second (Master) level in the Medicine specialty.

2 Background for studying discipline

The discipline is based on such subjects previously studied by students at general secondary school as General biology, Human biology, Animal biology, Plant biology. Medical biology lays the foundation for further acquisition of knowledge and skills of specialized theoretical and clinical professional and practical disciplines (biological and bioorganic chemistry, histology, cytology and embryology, physiology, microbiology, medical genetics, clinical immunology, infectious diseases, epidemiology, pediatrics, etc.).

3 Goal and objectives of the discipline

Physiology as a basic discipline is aimed at training highly qualified Masters of Medicine and is one of the most important subjects in the medical education system. The goal of the Physiology academic discipline is to study functions of different cells, tissues, organs and systems as a whole in order to use the acquired knowledge while learning subsequent medical disciplines and in future professional activities. It provides the understanding of the concept of health, healthy lifestyle and dysfunction in the process of life activities.

4 Learning outcomes

The goal of the Medical biology academic discipline follows from the objectives of the educational and professional program of training medical students and is determined by the content of systemic knowledge and skills that should be mastered by a doctor. The knowledge obtained by students in the academic discipline is basic for the block of disciplines providing natural science (NS block) and professional and practical (PP block) training.

Objectives:

- to provide students with a holistic understanding of the general regularities of development of living nature; the essence of life, its forms, individual and historical development of the organic world and the place of human beings in it; forms of biotic relationships in nature, life cycles of parasites and parasitic human diseases; the place of human beings in the biosphere;
- to provide fundamental biological training and acquisition of practical skills for subsequent professional activities of a general practitioner.

5 ECTS credits

PLO 1.	To have comprehensive knowledge of the structure of professional activities. To be able to carry out professional activities requiring updating and integration of knowledge. To be responsible for professional development, ability to further professional training with a high level of autonomy.
PLO 2.	To understand and know fundamental and clinical biomedical sciences at the level sufficient to solve professional tasks in the healthcare sector.
PLO 3.	Specialized conceptual knowledge that includes healthcare scientific achievements and is the foundation for research; critical comprehension of medical issues and related interdisciplinary problems.
PLO 21.	To find necessary information in professional literature, databases and other sources; to analyze, assess and apply this information.

5 ECTS credits

PLO 23.	To assess the environmental impact on human health to define the incidence rate of the population.

The academic discipline consists of 150 hours (16 hours of lectures, 64 hours of practical classes, 70 hours of independent work of students), 5 ECTS credits. The discipline is studied in the first semester.

6 Course Content

SECTION 1. Molecular and cytological foundations of human activity.
Content section 1. Molecular and cellular level of life organization.

Topics	Amount of hours			
	total	including		
		l	p	i.w.
Topic 1. Introduction to the medical biology course. Optical systems in biological research. Levels of living matter organization.	5	1	2	1
Topic 2. Morphology of the cell. Structural components of nucleus and cytoplasm.	5	1	2	2
Topic 3. Cell membranes. Transport of substances through the plasmalemma.	3	-	2	1
Topic 4. Nucleus. Chromosomes morphology. Human karyotype.	4	-	2	2
Topic 5. Molecular foundations of heredity. Characteristics of nucleic acids.	4	-	2	2
Topic 6. Gene structure in pro- and eukaryotes	5	-	2	3
Topic 7. Organization of information flow in the cell. Regulation of gene expression. Molecular mechanisms of human variability. Masculine gender. Genus exceptions.	4	-	2	2
Topic 8. Cell life cycle and division. Mitosis. Meiosis. Masculine gender. Genus exceptions.	5	-	2	3

SECTION 2. Organismal level of life organization. Fundamentals of human genetics.
Content section 2. Regularities of heredity and variability.

Topic 9. Particularities of human genetics. Mono-, di- and polyhybrid crossing. Mendelian traits of human beings.	4	-	2	2
Topic 10. Interaction of allelic and non-allelic genes. Pleiotropy. Genetics of blood groups	5	1	2	2
Topic 11. Chromosomal theory of heredity. Linked inheritance. Genetics of sex.	4	-	2	2

6 Course Content

SECTION 2. Organismal level of life organization. Fundamentals of human genetics.
Content section 2. Regularities of heredity and variability.

Topics	Amount of hours			
	total	including		
		l	p	i.w.
Topic 12. Variability in humans as a property of life and genetic phenomenon.	5	1	2	2
Content section 3. Methods of studying human heredity. Hereditary diseases.				
Topic 13. Fundamentals of medical genetics. Methods of studying human heredity.	5	1	2	2
Topic 14. Cytogenetic method. Chromosomal diseases	5	1	2	2
Topic 15. Biochemical method and DNA diagnostics.	4	-	2	2
Topic 16. Population and statistical method. Medical and genetic consulting.	4	-	2	2
Content section 4. Biology of personal development.				
Topic 17. Biological particularities of human reproduction. Gametogenesis. Fertilization.	4	-	2	2
Topic 18. Molecular genetic mechanisms of ontogenesis. Particularities of the prenatal period of human development. Ontogenesis disorders and their place in human pathology.	5	1	2	2
Topic 19. Postnatal period of human ontogenesis.	5	-	2	3
Topic 20. Biological mechanisms of maintaining homeostasis of the organism. Final class in sections 1, 2.	6	1	2	3
SECTION 2. Organismal level of life organization. Fundamentals of human genetics. **Content section 2. Regularities of heredity and variability.**				
Topic 21. Medical and biological foundations of parasitism. Medical protozoology. Subkingdom Protozoa. Type Sarcomastigophora. Class Lobosea. Type Ciliophora. Representatives of the Class Rimostomatea: human parasites.	5	1	2	2
Topic 22. Representatives of the Class Zoomastigophorea: human parasites. Type Apicomplexa. Representatives of the Class Sporozoa: human parasites.	5	1	2	2

6 Course Content

Topics	Amount of hours			
	total	including		
		l	p	i.w.
Content section 6. Medical helminthology				
Topic 23. Medical helminthology. Flatworms and roundworms - human parasites. Type Flat worms (Plathelminthes). Class Flukes (Trematoda): agents of human diseases.	6	2	2	2
Topic 24. Type Flat worms (Plathelminthes). Class Cestoidea: agents of human diseases (Part 1).	4	-	2	2
Topic 25. Type Flat worms (Plathelminthes). Class Cestoidea: agents of human diseases (Part 2).	4	-	2	2
Topic 26. Type Roundworms (Nemathelminthes). Class Nematoda: agents of human diseases (Part 1).	4	-	2	2
Topic 27. Type Roundworms (Nemathelminthes). Class Nematoda: agents of human diseases. Methods of laboratory diagnostics of helminthic diseases (Part 2).	4	-	2	2
Content section 7. Medical arachnoentomology				
Topic 28. Medical arachnoentomology. Arthropods - pathogens and vectors of infections and infestation. Type Arthropoda. Class Arachnoidea. Ticks (Acarina): pathogens and vectors of human pathogens. Venomous spiders.	6	2	2	2
Topic 29. Class Insecta. Blattoidea. Diptera: pathogens and vectors of human diseases.	5	-	2	3
Topic 30. Class Insecta: Anoplura, Aphaniptera, Hemiptera: agents and vectors of human diseases.	5	-	2	3
Content section 8. The relationship between individual and historical development. Biosphere and human beings				
Topic 31. Synthetic theory of evolution. Particularities of the action of evolutionary factors in human populations. Population structure of the humankind. The origin of human beings.	6	1	2	3
Topic 32. The biosphere as a system for ensuring human existence. Final class in Section 3: Population, species, biogeocenotic and biospheric levels of life organization.	6	1	2	3
Total hours	150	16	64	70

7 List of obligayory tasks

1. Organization of substance and energy flows in the cell
2. Cell life outside the organism. Cell cloning
3. Genetic maps. Methods of human chromosome mapping. Current state of human genome research
4. Genetic threat of environmental pollution. The concept of commutagens and antimutagens
5. Genetic engineering. Biotechnology. The concept of gene therapy
6. Methods of human genetics: dermatoglyphic, immunological, somatic cell hybridization
7. Old age as the final stage of human ontogenesis. Theories of aging
8. The concept of biofield, biological rhythm and their medical significance
9. Methods of laboratory diagnostics of diseases caused by parasitic protozoa
10. Trematoda: human parasites. Causative agents of metagonimiasis and nanofietosis.
11. Ticks: inhabitants of human dwellings and their medical role
12. Phylogeny of major vertebrate systems
13. Population structure of humankind
14. V.I. Vernadsky's doctrine of noosphere
15. Human penetration into biogeocenoses, formation of anthropocenoses

8 List of selective tasks

1. Creation of multimedia presentations on topics of practical classes
2. Creation of biological crossword puzzles on topics of practical classes
3. Making tables
1. Participation in the work of the student scientific group
4. Participation in the student Olympiad in the discipline
2. Participation in student scientific conferences
5. Organizing and visiting thematic museums
6. Publication of key points of presentations from scientific conferences co-authored with the lecturer

9 Discipline features

Period of teaching	Semester	International disciplinary integration	Year of study	Courses: general training/ professional training/elective
1 semester	3,4 semester	available	1	General training

10 Assessment system and requirements. General system of discipline assessment

Current student performance is assessed according to the 4-point scale (2; 3; 4; 5) during every practical class given the approved assessment criteria for a corresponding discipline. Students should obtain a grade in each topic for further conversion of grades into points due to the multi-point (200-point) scale.
Assessment criteria of current learning activities:
Excellent (5) – students answer correctly to 90-100% of A-format tests (from the Krok-2 database); solve case problems and can generalize the material.

10 Assessment system and requirements. General system of discipline assessment

Good (4) – students answer correctly to 70-89% of A-format tests; have necessary practical skills and techniques of their performance in the volume exceeding the required minimum.
Satisfactory (3) – students answer correctly to 50-69% of A-format tests; have an obligatory minimum of research methods.
Failure (2) – students answer correctly to 50% of questions, make significant, serious mistakes while answering and showing practical skills.
Students' independent work related to preparations for practical classroom activities is assessed during current control of a topic during a corresponding class.
A semester Pass/Fail test is assessed due to the two-point scale (Pass/Fail) and 200-point scale by defining the arithmetic average of current grades for each practical class due to the 4-point scale and by its further conversion into points of the 200-point scale. Minimum amount of points that should be obtained by students: 120.
The final control of knowledge in the Physiology discipline is conducted in the form of an exam. The exam is conducted in the form of a written test work with individual options, each one containing 3 theoretical questions.
https://ieu.edu.ua/docs/rate-of-study.pdf

11 Assessment system and requirements. General system of discipline assessment

Students who have completed all types of work, tasks provided for in the curriculum for the semester in accordance with the discipline, attended all classes provided for in the curriculum, written and submitted a medical history and have an average score for current academic activities of at least "3" (72 points on a 120-point scale) are allowed to take part in the semester final control
https://ieu.edu.ua/docs/rate-of-study.pdf

12 Admission to final control

The policy of the academic discipline is determined by the requirements that scientific and practical workers make to students in the study of clinical discipline. The condition for a successful educational process is personal compliance of each student of a higher education institution with the rules of behavior adopted both at the university and in society. A future doctor must have a high level of behavioral culture, behave with dignity, tact, and self-control.
The student must be on time for classes and wear academic medical uniform (white coat or surgical suit).
The student must adhere to the schedule of the educational process, come to class prepared on the topic of the class. During the class, the student should not leave the classroom without the permission of the teacher; use a cell phone and other means of communication and information without the permission of the teacher, engage in outside activities, distract other students. When writing different types of papers, students must adhere to the rules of academic integrity.
The teacher must adhere to the curriculum, objectively assess the knowledge and skills of students. During the educational process, the teacher must be aware of anti-corruption measures and not engage in corrupt activities.

13 Discipline policy

A student who, for valid reasons, confirmed by documentary evidence, was not subject to current control has the right to undergo current control within two weeks after returning to study.
A student who was absent from classes without valid reasons, did not participate in current control activities, did not eliminate academic debt, is not allowed to take the final semester control of knowledge in this discipline, and on the day of the exam, the academic staff member gives a grade of "not admitted" in the examination record.
Retaking the differentiated test in the discipline is assigned subject to the completion of all types of educational, independent (individual) work provided for by the working curriculum of the discipline and is carried out in accordance with the schedule of liquidation of academic debt approved by the directorate.
https://ieu.edu.ua/docs/050.pdf

14 Policy of absence and late task performance

Participants in the educational process are guided by the principles of academic integrity
https://ieu.edu.ua/docs/011.pdf

15 Recommended sources of information

Primary literature:

1. Medical biology: textbook / Edited by V.P. Pishak, Y.I. Bazhora. Textbook / Edition 4, revised and supplemented. - Vinnytsia: Nova Knyha, 2021. - 608 p.
2. Medical biology: textbook for students of medical higher and professional pre-higher education institutions / R.O. Sabadyshyn, S.Y. Bukhalska. – 3rd edition, amended and supplemented. - Vinnytsia: Nova Knyha, 2020. - 344 p.: ill.

Additional literature:

1. Medical Biology, Bazhora Yu. I., Bulyk R. Ye., Chesnokova M. M., Shevelenkova A. V., Smetyuk O. O., Lomakina Yu.V., Vinnytsia: Nova Knyha, - 2019
2. Medical Biology. Pishak V.P., Bazhora Yu. I., Vinnytsia: Nova Knyha, - 2017.
3. Medical parasitology. Atlas / Edited by Y.I. Bazhora. - Odesa: ODMU, 2001. - 110 p.
4. Bochkov N.V., Puzyrev V.P., Smirnikhina S.A. Clinical genetics / Textbook edited by academician N.P. Bochkov. - 4th edition. – M.: GEOTAR-Media, 2011. - 592 p.
5. Collection of tasks for preparation for the licensed test exam in natural science disciplines – Krok-1. General medical training / Team of authors; Edited by Prof. V.F. Moskalenko, Prof. O.P. Volosovets, Prof. I.E. Bulakh, Prof. O.P. Yavorsky, Prof. O.V. Romanenko, Associate Professor L.I. Ostapyuk. - K.: Medicine, 2004. 368 p.; P. 9-41.
6. Kovalchuk L.Y., Teliuk P.M., Shutak V.I. Human parasitology: Study guide. - Ivano-Frankivsk: Lilea, 2004, ill.
7. Medical biology: Guide to practical training / O.V. Romanenko, M.H. Kravchuk, et al. Edited by O.V. Romanenko. - K.: Health, 2005. - 372 p. Ill.
8. Pavlichenko V.I., Pishak V.P., Bulyk R.Y. Fundamentals of molecular biology: Study guide. - Chernivtsi: Medical University, 2012. - 388 p.; ill.
9. Pishak V.P., Zakharchuk O.I. Medical biology, parasitology and genetics. Workshop. Edition 2. - Chernivtsi:, 2012. - 632 p.; ill.
10. Saliak N.O. Workshop on medical biology: study guide. - 3rd edition, revised and supplemented. - K.: Medicine All-Ukrainian specialized publishing house, 2017. - 296 p.
11. Sliusariev A.O. Biology / A.O. Sliusariev, S.V. Zhukova. - K.: Higher School, 1992. - 461 p.
12. Taylor D., Green N., Stout W. Biology. In 3 volumes. - M.: Mir, 2002. - 1340 p.

15 Recommended sources of information

13. Scientific Bulletins of the Institute of Molecular Biology and Genetics: https://www.imbg.org.ua/uk/journals/
14. Scientific Bulletin of the Ukrainian Society of Geneticists and Breeders: http://utgis.org.ua/index.php/ua/publ-ua/visnyk-ua
15. Bulletin of Biological and Medical Problems: https://vpbm.com.ua/ua/

Additional sources of information:

1. Ministry of Education and Science of Ukraine: http://www.mon.gov.ua/
2. Ministry of Ecology and Natural Resources of Ukraine: http://www.menr.gov.ua/
3. State Emergency Service of Ukraine: http://www.dsns.gov.ua/
4. Testing Board – Database of Krok-1 licensed test assignments: http://testcentr.org.ua/
5. Testing Board at the Ministry of Health of Ukraine: https://www.testcentr.org.ua/uk/
6. Genetic Disorders http://omim.org/

16 Tips on successful study during the course

If you want to succeed in this discipline, you should:

1. Be active, insistent, curious, consecutive.
2. Be tidy and polite.
2. Systematically prepare for practical classes.
3. Attend lectures and take notes.
4. Accomplish tasks for independent work and present them during the class.
5. Carefully handle department equipment, in particular, microscopes.
6. Attend classes in a medical gown.
7. Solve tests and tasks on your own, work actively during the class.
8. Keep an album and sketch out macro- and micro-specimens.
9. Visit the Krok Center website and focus on medical biology questions.
10. Prepare presentations and crosswords dedicated to the discipline.
11. Take part in student scientific conferences.
12. Be engaged in research activities in scientific groups at the department.