

MINISTRY OF HEALTH OF UKRAINE
ODESSA NATIONAL MEDICAL UNIVERSITY
Department of clinical immunology, genetics and medical biology

SYLLABUS
OF THE EDUCATIONAL DISCIPLINE " BIOLOGY WITH BASES OF GENETICS"

The scope of the academic discipline	Total number of hours per discipline: 120 hours, 4 ECTS credits I - II semester, 1 year of study
Days, time, place	According to the approved schedule in the auditoria of clinical immunology, genetics and medical biology department, Olhivska str., 4
Lecturers	Shevelenkova Alla Vladimirovna: Ph.D. (Medicine), associate professor Chesnokova Marina Mikhailivna: Ph.D. (Medicine), associate professor
Contact information	Help by phone: Shevelenkova Alla: (097) -27-65-754 Chesnokova Marina: (048)728-54-74, (097) 256-10-33 E-mail: Shevelenkova Alla: <i>shevel2003@ukr.net</i> Chesnokova Marina: <i>marchesn2005@gmail.com</i> <i>Face-to-face consultations:</i> every Thursday – from 14:00 till 17:00, every Saturday – from 09:00 till 13:00. <i>For distance online studying consultations:</i> every Thursday – from 14:00 till 17:00, every Saturday – from 09:00 till 13:00 on the <i>Microsoft Teams, Zoom, Telegram, Viber</i> platforms

COMMUNICATION

Communication with students will be carried out through face-to-face meetings. In case of transition to distance online learning, communication with students will be carried out by phone, e-mail and *Microsoft Teams, Zoom, Telegram, Viber* platforms.

COURSE ANNOTATION

The subject of study of the discipline is biological base of human activities.

Prerequisites and post requisites of the course. (The place of the discipline in the educational program).

The educational discipline "BIOLOGY WITH BASES OF GENETICS" is based on the study by students of I course of such disciplines as "General Biology", "Biology of human", "Biology of Animals", "Biology of plants" during their study at school.

The educational discipline "BIOLOGY WITH BASIS OF GENETICS" integrates with such educational disciplines as "Pharmaceutical Botany", "Biochemistry", "Organic Chemistry", "Normal and Pathological Physiology", "Microbiology".

The aim of the discipline. The goal is formation of knowledge and practical skills of human biology for assimilation by students of a block of disciplines supplying natural- scientific and professional-practical education.

Tasks of the discipline.

1. To explain regularities of the vital functions of organism of a man at molecular-biological and cellular levels of living matter organisation;
2. To determine the displays of action of general biological laws in ontogenesis of a man.
3. To determine biological essence and mechanisms of development of disease, which arise up as a result of anthropogenic changes in an environment.

4. To explain essence and mechanisms of phenotypic manifestation of hereditary disorders in a man.
5. To make a preliminary conclusion about parasitic invasion in a man
6. To determine the methods of prevention of disorders caused by parasites.

Learning outcomes for discipline:

Upon completion of the study of the discipline "Medical biology" students must know:

- levels of living matter organization;
- forms of life and their fundamental properties;
- structural and functional organization of eukaryotic cell;
- molecular bases of heredity;
- cell cycle and types of cell division;
- main laws of heredity in mono-, di- and polyhybrid crossing and linked inheritance;
- genetic inheritance of blood groups by ABO antigen system and of rhesus factor;
- genetic inheritance of sex in human and sex-linked characters;
- variation, its forms and properties;
- methods of human genetics: pedigree, twins, dermatoglyphic, cytogenetic, molecular-genetic, biochemical and population-statistic methods;
- classification of hereditary diseases and principles of prenatal diagnosis of hereditary diseases;
- forms of reproduction of organisms;
- gametogenesis, forms of sex cells;
- definition of ontogenesis and its periodization;
- main stages of embryogenesis, molecular and cellular mechanisms of differentiation;
- types of regeneration;
- types of transplantation, reasons of tissue incompatibility;
- forms of symbiosis, parasitism as biological phenomenon;
- principles of classification of parasites and hosts;
- ways of transmission of parasitic diseases: obligate transmissible, facultative transmissible diseases; vector-borne and natural focal disease. - basics of prevention of parasitic diseases;
- causative agents of the most common protozoa, trematodes, cestodes, and nematodes;
- principles of laboratory diagnosis of helminthiasis;
- arthropods - vectors and pathogens of human diseases, the concept of mechanical and specific vectors, poisonous Arthropodes;
- the concept of population as an elementary unit of evolution, the population structure of humanity, demes, isolates; the concept of population as an elementary unit of evolution, the population structure of humanity, demes, isolates, functional types of people's response to environmental factors ("sprinter", "stayer", "mixed");
- concept of biological rhythms, their medical significance;
- the subject of ecology; types of environment, environmental factors;
- adaptive ecotypes of people;
- the role of man as an ecological factor, the main directions and results of anthropogenic changes in the surrounding environment;
- examples of plants and animals poisonous to humans;

Able:

- to solve case studies of the main discipline sections;
- to differentiate cell components;
- to make ideogram of human chromosomes;
- to identify the primary structure, number of amino acids, molecular weight of polypeptide structure of the gene encoding it;
- to analyze the structure of genes of pro- and eukaryotes;
- to analyze the sequence of gene regulation expression stages;

- to define the types of mendelian characters inheritance in human;
- to expect genotypes and phenotypes of offspring by the genotypes of the parents;
- to exclude paternity in determining blood groups of parents and child;
- to analyze complex mechanisms of humans traits inheritance;
- to develop measures to reduce the display of a pathological condition in patients with inherited pathology;
- to choose appropriate methods for the study of human heredity genetic for diagnosis of various diseases;
- to calculate the probability of hereditary diseases manifestation in off springs depending on gene penetrance;
- to differentiate chromosomal disease in humans;
- to conduct genealogical analysis of pedigrees with hereditary disease;
- to determine the role of heredity and environment in characters development (according to the twins analysis);
- to calculate the genetic composition of human populations;
- to apply the biogenetic law, to determine ontophylogenetic congenital malformations;
- to compare mechanisms of congenital malformations of various human genesis;
- to learn the basic principles of regeneration and transplantation;
- to determine the place of man as a biological object in the system of nature;
- to justify parasitic diseases belonging to the group of transmissible human and natural foci;
- to diagnose macro- and microspecimens of agents and carriers of parasitic diseases;
- to identify the different stages of parasites life cycle;
- to justify the methods of parasitic diseases laboratory diagnosis;
- to differentiate invasions diagnosis by laboratory methods;
- to prove the effectiveness of parasitic diseases prevention methods, depending on the ways of infection;
- to predict the impact of environmental factors on human.

COURSE DESCRIPTION

Forms and methods of teaching.

The educational discipline “Biology with bases of genetics” in the form of lectures (20 hours), practical classes (40 hours) and organization of independent work of students (60 hours).

Teaching methods:

Lectures. Verbal and visual teaching methods are used - explanatory-illustrative method (students gain knowledge by listening to a lecture and studying illustrative material in the form of multimedia presentations).

Practical classes: conversation, explanations, case studies, practical work.

Independent work: independent work with the textbooks from main and additional list of the literature, independent work with the data base, solving of MCQs, independent case studies.

The content of the discipline. List of the topics.

Topic 1. Introduction into the course of biology with bases of genetics. Levels of organization and fundamental characters of living matter. Optical systems in biological experiences.

Topic 2. Biological membranes. Transport across the cell membrane.

Topic 3. Morphology of the eukaryotic cell. Structural components of cytoplasm.

Topic 4. Structural components of nucleus. Morphology of chromosomes. Human karyotype.

Topic 5. Characteristics of the nucleic acids

Topic 6. Organization of information flow in the cell. Regulation of gene expression.

Topic 7. Cell life cycle. Cell division.

Topic 8. Biological peculiarities of human reproduction. Gametogenesis. Fertilization.

Topic 9. Molecular-genetic mechanisms of ontogenesis. Peculiarities of the prenatal period. Disruptions of ontogenesis and their place in human pathology. Periods of postembryonic human development.

Topic 10. Organism level of genetic information organization. Manifestations of the main

regularities of inheritance on the example of Mendelian traits of a person (mono-, di- and polyhybrid crossing)

Topic 11. Multiple alleles. Genetics of blood groups. Interaction of allele and non-allele genes.

Topic 12. Chromosomal theory. Genetic linkage. Genetics of sex.

Topic 13. Variation in human as feature of life and genetic phenomenon: phenotypic and genotypic variation.

Topic 14. Methods of human genetics. Pedigree and twins' methods, cytogenetic, biochemical methods. Methods of DNA-diagnosis. Population-statistics methods.

Topic 15. Medical and biological basis of parasitism. Medical protozoology.

Topic 16. Medical helminthology. Type Flat worms. Class Trematoda.

Topic 17. Medical helminthology. Type Flat worms. Class tapeworms.

Topic 18. Medical helminthology. Type Round worms.

Topic 19. Medical arachnoentomology. Ticks and insects – causative agents and disease vectors.

Topic 20. The biosphere as a system supplying human existence. Human ecology. Adaptation to environmental conditions. Adaptation, stress

List of recommended materials:

Main literature

1. Medical biology. Yu. I. Bazhora, R. Ye. Bulyk, M.M. Chesnokova, A. V. Shevelenkova, O.O. Smetyuk, Yu. V. Lomakina. - Vinnytsya: Nova Knyha – 2019. - P.448

Additional literature

1. Before we are born : Essentials of embryology and birth defects / Keith L. Moore, T. V. N. Persaud, Mark G. Torchia. – 8th ed. – Elsevier, 2013. – 348 pp.
2. Campbell biology / Lisa Urry, Michael Cain, Steven Wasserman, Peter Minorsky, Jane Reece. – 11th restricted ed. – Hoboken : Pearson Higher Education, 2016.
3. Chiodini P. L. Atlas of Medical Helminthology and Protozoology 4th ed. – Churchill Livingstone, 2003. – 87 pp.
4. Emery's Elements of medical genetics. 15th ed. / Peter Turnpenny, Sian Ellard. – Elsevier, 2017. – 400 pp.
5. Essential Cell Biology by Bruce Alberts [et al] 4th edition – 2014 – 864 pp.
6. Human parasitology / Bruton J. Bogitsh, Clint E. Carter. – 4th ed. – Elsevier, 2013. – 430 pp.
7. Langman's medical embryology / T. W. Salder. – 13th ed. – Wolter Kluwer Health, 2015. – 423 pp.
8. Lynn B. Jorde, John C. Carey, Michael J. Bamshad. Medical genetics. 5th ed. Elsevier, 2016. 356 pp.
9. Markell and Voge's Medical parasitology / David. T. John, William A. Petri. – 9th ed. – Elsevier, 2017. – 463 pp.
10. Vogel and Motulsky's human genetics. Problems and approaches / M. R. Speicher, S. E. Antonarakis, F. G. Motulsky. 4th addition. – Springer, 2010. – 981 pp.
11. Young Ian. D. Medical genetics. – 2nd ed. – Oxford university press, 2010. – 304 pp.

Information resources:

1. Testing Center - the base of licensing test tasks "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/>
3. The tech interactive: <https://genetics.thetech.org/genetics-news>
4. Phys.org internet news portal provides the latest news on science. <https://phys.org/biology-news/>

5. Sci-News.com provides the latest science news from around the world, covering breaking news in astronomy and astrophysics, archaeology, paleontology, medicine, biology, physics, genetics & more <http://www.sci-news.com/news/biology>
6. link to the most thought-provoking, well researched online items in the world of science and technology <https://scitechdaily.com/news/biology/>
7. Web atlas of medical parasitology <http://www.atlas.or.kr/about/index.html>

EVALUATION

Current control is carried out on the basis of control of theoretical knowledge, practical skills and abilities: recitation, testing, assessment of practical skills conducting, case studies, assessment of activity in the classroom.

Final control: Differential credit

The structure of the current assessment in the practical lesson:

1. Assessment of theoretical knowledge on the topic of the lesson:
 - methods: recitation, interview, case studies;
 - maximum point - 5, minimum point - 3, unsatisfactory point - 2.
2. Assessment of practical skills and abilities on the topic of the lesson:
 - Case studies, methods: assessing the accuracy of practical skills conducting
 - maximum point- 5, minimum point - 3, unsatisfactory point - 2;

Criteria for current assessment in the practical class:

«5	The student is fluent in the material, takes an active part in the discussion and case studies, confidently demonstrates practical skills during performing and interpreting of practical work on the topic of the lesson, expresses his opinion on the topic of the lesson.
«4	The student is well versed in the material, participates in the discussion and case studies, demonstrates practical skills while performing practical work with some mistakes, expresses his opinion on the topic of the lesson.
«3	The student does not have enough knowledge on theoretical material, insecurely participates in the discussion and case studies, performs practical work with significant errors.
«2	The student does not have knowledge on theoretical material, does not participate in the discussion and case studies, does not demonstrate practical skills during the practical work on the topic of the lesson.

Evaluation of independent work.

Independent work of students, which is included in the topic of the lesson along with the auditory work, is evaluated during current control of the topic on the proper lesson.

Only those applicants who have fulfilled the requirements of the training program in the discipline, have no academic debt and their average score for the current educational activity in the discipline is at least 3.00 are admitted to the final control in the form of a differential credit.

Evaluation of the learning results of the applicants during the final control - of differential credit

The content of the evaluation activity	Scores
1. One question according to content modules 1 and 2 (Molecular-cellular level of life organization and Biology of individual development). Answers questions from 1 to 22 of item 11 Questions for preparation for differential credit	1
2. One question according to content modules 3 and 4 (Organic level of life organization. Patterns of heredity and variability and Methods of studying human heredity. Hereditary diseases). Answers questions from 23 to 44 of item 11 Questions for preparation for differential credit	1
3. One question according to content modules 5, 6 and 7 (Medical and	1

biological basis of parasitism. Medical protozoology, Medical helminthology and Medical arachnoentomology. Biosphere and man). Answers questions from 45 to 77 of item 11 Questions for preparation for differentiated assessment	
4. One task, according to content modules 1 and 2 (Molecular-cellular level of life organization and Biology of individual development).	1
5. . One task, according to content modules 3 and 4 (Organic level of life organization. Patterns of heredity and variability and Methods of studying human heredity. Hereditary diseases).	1

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Criteria for evaluating the results of education of students on differential credit

«5»	is given to the applicant who has answered all the questions, is able to successfully perform the tasks provided for in the program, has mastered the content of the main and additional literature, has realized the interrelationship of individual sections of the discipline, their importance for the future profession, has shown creative abilities in understanding and using the educational and program material , showed the ability to independently update and replenish knowledge; the level of competence is high (creative);
«4»	is given to the applicant who has fully answered 4 questions, demonstrated full knowledge of the curriculum material, successfully completed the tasks provided by the program, mastered the basic literature recommended by the program, showed a sufficient level of knowledge in the discipline and is capable of their independent updating and renewal in the course of further education and professional activity; the level of competence - sufficient (constructive-variable);
«3»	is given to the applicant who has fully answered 3 questions, has demonstrated knowledge of the main curriculum material to the extent necessary for further education and subsequent work in the profession, copes with the tasks provided for in the program, has made individual errors in answers and tasks, but has the necessary knowledge to overcome the mistakes made under the guidance of a scientific and pedagogical worker; level of competence - average (reproductive)
«2»	is given to the applicant who did not demonstrate sufficient knowledge of the main educational program material, made fundamental mistakes in the performance of the tasks provided for by the program, cannot use the knowledge in further studies without the help of a teacher, did not manage to master the skills of independent work; the level of competence is low (receptive-productive)

The obtained average score for the academic discipline for applicants who have successfully mastered the work program of the academic discipline is converted from a traditional four-point scale to points on a 200-point scale, as shown in the table:

National grade for the discipline	Total grades for the discipline
Excellent «5»	185-200
Good «4»	151-184
Satisfactorily «3»	120-150
Unsatisfactorily «2»	Less than 120

A multi-point scale (200-point scale) characterizes the actual success of each applicant in learning the educational component. The conversion of the traditional grade (average score for the academic discipline) into a 200-point grade is performed by the information and technical department of the University.

According to the obtained points on a 200-point scale, the achievements of the applicants are evaluated according to the ECTS rating scale. Further ranking according to the ECTS rating scale

allows you to evaluate the achievements of students from the educational component who are studying in the same course of the same specialty, according to the points they received.

The ECTS scale is a relative-comparative rating, which establishes the applicant's belonging to the group of better or worse among the reference group of fellow students (faculty, specialty). An "A" grade on the ECTS scale cannot be equal to an "excellent" grade, a "B" grade to a "good" grade, etc. When converting from a multi-point scale, the limits of grades "A", "B", "C", "D", "E" according to the ECTS scale do not coincide with the limits of grades "5", "4", "3" according to the traditional scale. Acquirers who have received grades of "FX" and "F" ("2") are not included in the list of ranked acquirers. The grade "FX" is awarded to students who have obtained the minimum number of points for the current learning activity, but who have not passed the final examination. A grade of "F" is given to students who have attended all classes in the discipline, but have not achieved a grade point average (3.00) for the current academic activity and are not admitted to the final examination.

Applicants who study in one course (one specialty), based on the number of points scored in the discipline, are ranked on the ECTS scale as follows:

Conversion of the traditional grade from the discipline and the sum of points on the ECTS scale

ECTS Point	Statistics indicator
«A»	The best 10 % of the students
«B»	Next 25 % students
«C»	Next 30 % students
«D»	Next 25 % students
«E»	Next 10 % students

INDEPENDENT WORK OF A STUDENT

Independent work involves preparation for each practical lesson, preparation for the differential credit.

COURSE POLICY

Deadlines and Rework Policy:

- Absences of classes for non-respectable reasons are worked out according to the schedule of the teacher on duty.
- Absences due to valid reasons are processed according to an individual schedule with the permission of the dean's office.
- Unsatisfactory assessment from the final practical lesson is rewritten on the days of consultations and exercises; in the case of distance learning - in the terms determined and agreed with the teacher.
- The rewriting of an unsatisfactory grade from the final test control is carried out according to a schedule agreed with the Educational and Production Complex of Innovative Technologies of Learning, Informatization and Continuous Education of the Odessa National Medical University
- Retaking the exam is carried out according to the schedule agreed with the dean.

Academic Integrity Policy:

Applicants must observe academic integrity, namely:

- independent performance of all types of work, tasks, forms of control provided for by the work program of this educational discipline;
- references to sources of information in the case of using ideas, developments, statements, information;
- compliance with the legislation on copyright and related rights;
- provision of reliable information about the results of one's own educational (scientific) activity, used research methods and sources of information.

Unacceptable in educational activities for participants of the educational process are:

- using family or official ties to obtain a positive or higher grade during any form of control of learning outcomes or academic performance;
- use of prohibited additional materials or technical means (cheat sheets, notes, micro-earphones, telephones, smartphones etc.) during control measures;
- passing procedures for control of training results by fake persons

For violation of academic integrity, students may be held to the following academic responsibility:

- a decrease in the results of assessment of control work, assessment in class, credit, etc.;
- retaking the assessment (control work, credit, etc.);
- appointment of additional control measures (additional individual tasks, control works, tests, etc.);
- conducting an additional inspection of other works authored by the violator.

Attendance and Tardiness Policy:

Attending all types of classroom classes (lectures, practical classes) is mandatory.

Uniform: a medical gown that completely covers the outer clothing, or medical pajamas, a cap, a mask, and a change of shoes.

Equipment: notebook, pen, methodological instructions, album.

State of health: applicants suffering from acute infectious diseases, including respiratory diseases, are not allowed to attend classes.

A student who is late for class can attend it, but if the teacher has put "ab" in the journal, he must complete it in the general order.

Use of mobile devices:

Mobile devices may be used by students with the permission of the teacher if they are needed for the assignment.

Behavior in the audience:

The behavior of applicants and teachers in the classrooms must be working and calm, strictly comply with the rules established by the Regulations on academic integrity and ethics of academic relations at Odessa National Medical University, in accordance with the Code of Academic Ethics and University Community Relations of Odessa National Medical University, Regulations on Prevention and detection of academic plagiarism in research and educational work of students of higher education, scientists and teachers of Odessa National Medical University