

Odessa national medical university
Department of clinical immunology, genetics and medical biology

SYLLABUS
OF THE EDUCATIONLA DICIPLINE
" THEORETICAL BASIS OF MOLECULAR MEDICINE"

Scope	4 ECTS credits/120 hours
Semesters, year of education	IV semester, 2 year of study
Days, time, place	According to the approved schedule in the auditoria of clinical immunology, genetics and medical biology department, Olhiivska str., 4
Lecturers	Shevelenkova Alla Vladimirovna: Ph.D. (Medicine), associate professor of clinical immunology, genetics and medical biology department Chesnokova Marina Mikhailivna: Ph.D. (Medicine), associate professor of clinical immunology, genetics and medical biology department
Contact telephone number	(048)728-54-74
E-mail	Shevelenkova Alla Vladimirovna: alla.shevelenkova@onmedu.edu.ua Chesnokova Marina Mikhailivna: <i>marchesn2005@gmail.com</i>
Work place	Auditoria of clinical immunology, genetics and medical biology department, Olhiivska str., 4
Supervision	<i>Face-to-face</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, by phone, E-mail. 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 there are molecular genetic bases of etiology, pathogenesis, diagnosis, treatment and prevention of human pathology.

Prerequisites and postrequisites of the course. The place of discipline in the educational program.

The educational discipline "Theoretical bases of molecular medicine" is based on the study of medical biology, histology, cytology and embryology, biological and bioorganic chemistry, general and clinical pathological physiology, microbiology, virology and immunology, pharmacology and clinical pharmacology, medical genetics, infectious diseases, internal medicine, oncology, which involves integration with these disciplines and forms the ability to apply knowledge in the process of further education and professional activity.

The aim of the discipline. The purpose of educational discipline "Theoretical bases of molecular medicine" is to master a set of knowledge, skills, and abilities in the use of modern molecular genetic technologies in the diagnosis, treatment and prevention of human diseases, which is important for the rational use of the achievements of molecular medicine in practical professional activities and scientific research.

Tasks of the discipline.

The main tasks of studying the discipline "Theoretical bases of molecular medicine" are provision of knowledge to those obtaining the degree of Doctor of Philosophy of the

- spectrum of modern molecular genetic methods and their application to the diagnosis of hereditary diseases, infectious diseases, determination of predisposition to multifactorial diseases, in forensic medicine;

- molecular genetic approaches to the treatment and prevention of human diseases;

Learning outcomes for discipline:

After completing the study of the academic discipline "Theoretical bases of molecular medicine", the applicant of the degree of Doctor of Philosophy must ***know:***

- methods of molecular genetic diagnostics and directions of their use in practical medicine;

- the basic principles of gene and cell therapy and its application in the treatment of hereditary and non-hereditary diseases;

- the role of pharmacogenetic research in personalized pharmacotherapy

- molecular genetic mechanisms of oncogenesis, the latest methods of diagnosis and treatment of cancer based on molecular genetic technologies.

Upon completing of the studying of the discipline "Modern problems of molecular biology" the student must ***be able to:***

- determine the indications for the use of molecular genetic diagnosis methods and interpret the results of research;

- explain to the patient the possibilities and limitations of gene therapy methods;

- evaluate the expediency of molecular genetic testing to determine hereditary susceptibility to multifactorial diseases and pharmacogenetic testing.

COURSE DESCRIPTION

Forms and methods of education.

A total of 120 hours are allocated for the study of the academic discipline "Theoretical bases of molecular medicine" (4 ECTS credits).

The educational discipline "Theoretical bases of molecular medicine" will be

taught in the form of lectures (10 hours), seminar classes (50 hours) and organization of independent work of students (60 hours). During the teaching of the academic discipline "Theoretical bases of molecular medicine", methods of problem-based teaching, as well as explanatory and illustrative, reproductive and heuristic methods are used. The main types of educational classes are lectures, seminars (seminars-discussions), consultations.

The topics of the lectures are determined by the curriculum of the academic discipline, provided by the texts of the lectures and illustrated by multimedia presentations. The teaching in seminar classes is provided by methodical recommendations for each topic, visual teaching aids for each class (presentations, video lectures), the department's information resource, and structured skill control algorithms.

Independent work of students is the main means of mastering the educational material. It includes studying the educational material, preparing for seminar classes, and completing individual tasks. Independent work in the study of a selective academic discipline is ensured by methodical recommendations for independent work, visual teaching aids (video lectures, presentations), information resource of the department, topics of independent work.

During the study of the academic discipline "Theoretical bases of molecular medicine", individual and group consultations are planned, which will be carried out through face-to-face meetings, telephone communication, use of *e-mail*, *Microsoft Teams*, *Zoom*, *Telegram*, *Viber* platforms.

The study of the discipline ends with a credit at the last seminar session.

The content of the discipline. List of the topics.

Topic 1. Organization of human hereditary information.

Topic 2. Gene expression and its regulation

Topic 3. Problems of mutagenesis and molecular mechanisms of hereditary diseases.

Topic 4. Regulation of the cell cycle. Basis of oncogenetics.

Topic 5. Multifactorial diseases, basis of pharmacogenetics.

Topic 6. Molecular and genetic methods of diagnosis.

Topic 7. Methods of genetic engineering. Transgenic organisms in medicine.

Topic 8. Gene therapy, modern directions.

Topic 9. Reparative medicine. Stem cells therapy.

Topic 10. Cloning of organisms.

Topic 11. Control of practical skills and theoretical knowledge Credit class.

List of recommended literature materials:

1. Main literature

Molecular biology of the cell by Bruce Alberts [et al] 6th edition – 2015 -1464 pp

2. Additional literature

1. Clevio Nobrega, Liliana Mendonca, Carlos A.Matos. A Handbook of Gene and Cell Therapy- Springer, 2020. – 188 pp.

2. Emery's Elements of medical genetics. 15th ed. / Peter Turnpenny, Sian Ellard. – Elsevier, 2017. – 400 pp.

3. Essential Cell Biology by Bruce Alberts [et al] 4th edition – 2014 – 864 pp.
4. Genetics in medicine. - 7th edition/Robert L.Nussbaum, Roderick R. McInnes, Huntington F. Willard. – 2007 – 585 p.
5. Lynn B. Jorde, John C. Carey, Michael J. Bamshad. Medical genetics. 5th ed. Elsevier, 2016. 356 pp.
6. Read A., Donnai D. New clinical genetics. A guide to genomic medicine. 4th ed. Scion Publishing Ltd, UK, 2021.
7. Speicher M. R., Antonarakis S. E., Motulsky F. G. Vogel and Motulsky's human genetics. Problems and approaches. 4th ed. Springer, 2010. 981 pp.
8. Young Ian.D. Medical genetics. -2nd ed. -Oxford university press, 2010. - 304 p.

Information resources:

1. <https://ghr.nlm.nih.gov> and <https://www.ncbi.nlm.nih.gov/books>
US National Biotechnology Information Center (NCBI) database, which presents biomedical books, NCBI manuals, etc., and provides access to genetics resources like *GeneReviews* (<https://www.ncbi.nlm.nih.gov/books/NBK1116/>) an international point-of-care resource for busy clinicians, provides clinically relevant and medically actionable information for inherited conditions in a standardized journal-style format, covering diagnosis, management, and [genetic counseling](#) for patients and their families
2. <http://omim.org/OMIM> (Online Mendelian Inheritance in Man) – An Online Catalog of Human Genes and Genetic Disorder
3. <https://genetics.thetech.org/genetics-news> The tech interactive
4. <https://phys.org/biology-news/>-bPhys.org internet news portal provides the latest news on science.
5. <http://www.sci-news.com/news/biology> - 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
6. <https://scitechdaily.com/news/biology/> - link to the most thought-provoking, well researched online items in the world of science and technology

EVALUATION

Current control is carried out at seminar classes in accordance with formulated tasks for each topic. When evaluating educational activities, preference is given to standardized control methods: oral survey, structured written works, discussions, role-playing games, reports. When mastering each topic for the current educational activity, the student is given grades on a 4-point traditional scale. The current academic performance is calculated as the average current score, i.e. the arithmetic average of all grades received by the graduate student (student) on a traditional scale rounded to 2 (two) decimal places, for example 4.75. Assessment of current discipline control:

The meaning of the "excellent" assessment: the applicant for the degree of Doctor

of Philosophy shows special creative abilities, knows how to acquire knowledge independently, finds and processes the necessary information without the help of a teacher, knows how to use the acquired knowledge and skills to solve problems, is able to produce innovative ways of solving problems, convincingly argues answers, independently reveals his own gifts and inclinations.

The value of the "good" grade: the applicant for the degree of Doctor of Philosophy is fluent in the studied amount of material, applies it in practice, freely solves exercises and tasks in standard situations, independently corrects the mistakes made, the number of which is insignificant.

The value of the rating is "satisfactory": which the applicant for the degree of Doctor of Philosophy is able to master a significant part of the theoretical material, but mainly in a reproductive form, demonstrates knowledge and understanding of the main provisions, can analyze the educational material with the help of the teacher, correct errors, among which there are a significant number of essential ones.

The value of the assessment is "unsatisfactory": the applicant for the degree of Doctor of Philosophy has mastered the material at the level of individual fragments, which constitute a small part of the educational material.

Only those applicants for the degree of Doctor of Philosophy who have no academic debt and have an average score for the current educational activity of at least 3.00 are admitted to the final credit.

Forms and methods of final control.

The final control in the discipline "Theoretical foundations of molecular medicine" is a credit. The grade for the discipline is the arithmetic average of two components:

- 1) Average current score as the arithmetic average of all current grades;
- 2) Traditional credit assessment.

The obtained average score for the discipline by multiplication by 40 (the resulting score is rounded to whole numbers) is converted into a score on a 200-point scale, which, in turn, is converted into a traditional score on a discipline on a 4-point scale.

Table of conversion of multi-point assessment to traditional

National score for a discipline	Sum of points for a discipline
«5»	185 – 200
«4»	151 – 184
«3»	120 – 150
«2»	Less than 120

INDEPENDENT WORK OF AN APPLICANT FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Independent work, which is provided by the topic of the seminar classes along with the classroom work, is assessed during the current control of the topic in the relevant lesson.

IW topics:

1. Human genetic passport: significance and problems.
2. Ethical issues in gene therapy.

COURSE POLICY

The policy of studying the discipline "Theoretical bases of molecular medicine" is determined by the system of requirements that the teacher imposes on the applicant in the study of the discipline. Requirements apply to attendance of all types of classes (inadmissibility of absences, being late), rules of conduct in the classroom (active participation, compliance with the required minimum of educational work), incentives and penalties. The policy of the academic discipline is built taking into account the norms of the legislation of Ukraine on academic integrity, the Statute and provisions of ONMedU, other normative documents.

Deadline and reattempt policy.

Applicants, have not missed lectures and seminar classes or completed missed auditorium classes and have an average score of at least 3.00 are allowed for control. Reassignment of unsatisfactory grades and absences is allowed for 2 weeks without the permission of the dean on the days of consultations and practice (Tuesday and Saturday), later - with the permission of the dean; in case of distance online learning - in the terms determined and agreed with the teacher.

Academic Integrity Policy.

Observance of academic integrity by PhD seekers provides independent fulfillment of all types of educational tasks, tasks of current and final control of learning outcomes; references to informational sources in the case of using borrowed ideas, developments, statements, information; providing reliable information on the results of their own educational activities, used research methods and sources of information.

Unacceptable in educational activities for participants of educational process are usage of prohibited auxiliary materials or technical means (cheat sheets, abstracts, headphones, telephones, smartphones, etc.) during control; passing the procedures of control of learning outcomes by fictitious persons.

For violation of academic integrity, students may be held subject to the following academic liability: reduction of evaluation results; repeating of the differential test; appointment of additional control measures (individual tasks, additional control tests, etc.); re-passing the relevant educational component of the educational program, notification of the parents of the applicant for higher education about the committed violation;

Attendance and lateness policy.

Attendance of practical classes is obligate.

The student is allowed to be late for no more than 10 minutes and only for a serious reason

Mobile devices.

Mobile devices can be used during classroom classes only with the permission of the teacher.

Behavior in the classroom.

While in the classroom, friendliness, correctness, respect for the teacher and classmates, tolerance for the opposite point of view, a constructive approach to solving problems, adherence to the ethics of academic relations are important. Teachers and students must be in medical gowns and hats, during face-to-face classes in case of

special epidemic regime (adaptive quarantine) - in properly dressed protective medical masks or respirators.