International School of Medicine
Department of " Foundamentls Disipline"

SYLLABUS

" Molecular biology "

main educational program
in the specialty General Medicine (for foreign citizens)

graduate qualification: general practitioner

Full-time education
Well
Semester 2
Credit / Exam (semester) 2
Total Curriculum Credits 3
Total curriculum hours 90

Bishkek 2022

1. The work program of the academic discipline

1.1. Explanatory note

Mission of ISM IUK - *training of competent specialists in the field of medicine, corresponding to international standards and traditions of medical ethics, ready for continuous professional growth using modern achievements of science and practice, to solve public health problems.*

Annotation of the academic discipline: Teaching this subject is built on the systematic study of the laws and regulations of heredity and variability at the molecular level. "Molecular Biology" is a basic subject, preparing for the study of hereditary diseases in subsequent courses.

The program is designed for theoretical and practical training of qualified specialists
The study of "Molecular Biology" at medical faculties is relevant in connection with the increase in recent years of hereditary diseases, as well as the relevance of the development of genetic engineering and biotechnology.

The purpose of the discipline: "Molecular Biology" is the formation of fundamental systemic knowledge, skills and abilities on general biological and genetic laws at the molecular level, which is of greatest interest for practical health care. Due to advances in molecular biology and breeding.

Discipline objectives: To study the main approaches to the organization and functioning of living systems and the general properties of living things
To acquaint with the experience of applying general patterns of transmission and changes in hereditary traits and properties in generations, their role in hereditary human pathology;
Form ideas about**;**
- the subject and tasks of genetics
- the role of genetic laws in the inheritance of traits.

To be able to apply the laws of inheritance to determine the likelihood of the appearance of normal and pathological traits in the genotype and their manifestation in the phenotype, to predict the likelihood of developing hereditary diseases in humans using examples of solving genetic problems: master development skills
Develop competencies, professional qualities
Master the skills of developing genetic problems:

Place of discipline in the structure of OOP (prerequisites, postrequisites)
In accordance with the State Educational Standard of Higher Professional Education (state educational standard), all competencies are written out in the relevant direction, the formation of which is fully or partially carried out when studying this discipline in all forms of classes and work of students (selected competencies should be formed at each lesson):
a) universal:
-general scientific (OK):

b) professional (PC)

Prerequisites:	Molecilar biology with the basics of ecology, antomy, chemistry, physiology, histology.
Post-requisites:	pathological physiology, pathological anatomy, medical genetics, pediatrics, therapy, obstetrics and gynecology

Competencies of students, formed as a result of mastering the discipline, the planned results of mastering the discipline : - A graduate in the specialty "General Medicine" with the qualification of a specialist (doctor) in accordance with the goals of the PLO and the tasks of professional activity, must have the following professional competencies: professional competencies: OK-1, OK-3, SLK-1

Code	Content of competence
OK-1	- able and ready to analyze socially significant problems and processes, use the methods of natural sciences, mathematics and the humanities in various types of professional and social activities;
OK-3	- is able and ready to collect, process and interpret, using modern information technologies, the data necessary to form judgments on relevant social, scientific and ethical problems;
SLK-1	able and ready to implement ethical, deontological and bioethical principles in professional activities;

After mastering the discipline " **Molecular biology** " student:

will know: Basic biological terminology;
• Basics of cytology; Prokaryotic and non-cellular life forms
• Basics of genetics;

will be able to used: • Laws of genetics for solving genetic problems;
• Skills of calculating genetic patterns and solving problems;
• Skills of working with devices;
• Primary skills of scientific research, describing the results of the experiment and obtaining conclusions;
• skills of searching for scientific information in the library fund and via the Internet.

will own: Biological terminology to explain the meaning and significance of basic concepts, laws and patterns of molecular biology;

will be able to analyze : Questions, build your own statement on the studied topic, give a general description of the biological system or object;

Will be able to exercise (accomplish): Experiment in accordance with the guidelines for laboratory work;

• Independent work;

will be able to assess: structure, generalize and systematize the collected scientific material for writing an abstract, preparing a presentation and an oral report.

1.2. Recommended educational technologies: For the development of students of the academic discipline "Molecular Biology", the acquisition of knowledge and the formation of professional competencies, the following educational technologies are used:

• lecture with elements of discussion, problem statement;
• lectures - electronic presentations;
• analysis of specific situations;
• role-playing game, etc.

1.3. The scope of the discipline and types of educational work

According to the curriculum 2022	**2 sem.**	**Total**	
		in hours	**in credits**
Total labor intensity			**3**
Classroom work		**90**	
Lectures		18	
Practical lessons		36	
Seminars		18	
Laboratory works		18	
Independent work		54	
CPC		18	
SRSP		36	
Final control type		**exam**	

1.4. Discipline structure

1.4.1. Thematic plan for the study of the discipline

___ semester ____ course

No.	Name sections and topics disciplines (lectures and practical exercises)	Auditory lessons				Total hours on classroom work	SRSP	Student independent work	Formed competence	Used educational technologies, methods and methods of teaching	Dummies	Forms of current and midterm control academic performance
		lectures	seminars	practical lessons	laboratory works							
	Module 1											
1	*Topic 1* Development history, methods, concepts of molecular biology. Cytology. Eukaryotes and prokaryotes cell.	*2*	2	4	2	10	2	4	*OK-1, OK-3,*	*lecture using video materials simulators, microscop*		*Test task Theoretical survey*
2	*Topic 2 Cellular inclusions*	2	2	4	2	10	2	2	*OK-3, SLK-1*	*classes using simulators,*		*Test tasks Theoretical survey*
3	*Topic 3 Metabolism*	2	2	4	2	10	2	4	*OK-1, SLK-1*	*Interview on the situation. Tasks/ Lecture-debate.*		*Test tasks Interview on the situation. tasks*
4	*Topic 4 /Macronutryents/Micronutrients*	2	2	4	2	10	2	4	*OK-1, OK-3, SLK-1*	*Interview on the situation. tasks /Lecture-debate. "round table"*		*Test tasks Theoretical survey Interview on the situation. tasks*
	Module 2											
5	Molecular mechanisms of storage, transmission and implementation of genetic information	2	2	4	2	10	2	4	*OK-1, OK-3,*	*lecture-visualization*		*Test tasks Theoretical survey*
6	Synthesis of protein and RNA. Transcription. Translation	2	2	4	2	10	2	4	*OK-1, OK-3, SLK-1*	*Lecture with an analysis of clinical cases*		*Test tasks*

7	Mode of gene expressions is various and depends on properties of genes. Replication, of DNA repairation.	2	2	4	2	10	2	4	*OK-1, OK-3, SLK-1*	*Lecture with an analysis of clinical cases*		*Test tasks Theoretical survey*
8	Molecular mechanisms of mutagenesis and recombination of genetic material (crossing over and types of mutations)	2	2	4	2	10	2	4	*OK-3, SLK-1*	*Lecture-discussion of the forum type/*		*Test tasks Interview on the situation. tasks*
9	Type of inheritance	2	2	4	2	10	2	4	*OK-1, OK-3, SLK-1*	*Lecture with an analysis of clinical cases /Lecture-debate. "round table"/*		*Test tasks Interview on the situation. tasks*
	Total hours by discipline:	18	18	36	18	90	18	36				

Abbreviation for designations of educational technologies, methods and methods of teaching:*traditional lecture (L), lecture-visualization (LP), problem lecture (LP), lecture-press conference (LPK), lesson-conference (LC), training (T), debate (D), brainstorming (MSH) , master class (MC), "round table" (CC), activation of creative activity (ATD), regulated discussion (RD), forum type discussion (F), business and role-playing educational game (CI, RI), small group method (MG), classes using simulators, simulators (TP), computer simulation (CS), analysis of clinical cases (CS), preparation and protection of medical history (IB), use of computer training programs (COP), interactive atlases (IA), attending medical conferences, consultations (VC), participation in scientific and practical conferences (NPK), congresses, symposia (Sim), educational and research work of a student (UIRS), conducting subject Olympiads (O),preparation of written analytical works (AR), preparation and defense of abstracts (P), design technology (PT), excursions (E), distance educational technologies (DOT).*

Reducing the forms of current and midterm monitoring of academic performance: *T - testing, Pr - assessment of the development of practical skills (abilities), 3C - solving situational problems, KP - control work, K3 - control task, IB - writing and protecting a case history, CL - writing and protecting a curatorial sheet, R - writing and defense of the abstract, C - interview on control questions, D - preparation of a report, etc.*

1.4.2. Organization of students' independent work
2 semester 1course

No	The topic of the student's independent work:	SRS task	Recommended literature	Timing surrender (week number)
1	*Topic 1* Development history, methods, concepts of molecular biology. Cytology. Eukaryotes and prokaryotes cell.	Abstract	PDF Lectures 1.Molec.biology Navigator for information resources. http: //www.spsl.nsc. 2.ru/win/nelbib/biolog/pricl.biology.htm 3. Educational resource of the Internet. Molec Biology. http://www.alleng.ru./edu/biolog 2.htm/	**1,2**
2	*Topic 2* *Cellular inclusions*	Essay function. Laboratory work.	PDF Lectures 1.Molec.biology Navigator for information resources. http: //www.spsl.nsc. 2.ru/win/nelbib/biolog/pricl.biology.htm 3. Educational resource of the Internet. Molec Biology. http://www.alleng.ru./edu/biolog 2.htm	**3,4**
3	*Topic 3* *Metabolism*	Abstract	PDF Lectures 1.Molec.biology Navigator for information resources. http: //www.spsl.nsc. 2.ru/win/nelbib/biolog/pricl.biology.htm 3. Educational resource of the Internet. Molec Biology. http://www.alleng.ru./edu/biolog 2.htm	**5,6**
4	*Topic 4* */Macronutryents/Micronutrients*	Abstract	PDF Lectures 1.Molec.biology Navigator for information resources. http: //www.spsl.nsc. 2.ru/win/nelbib/biolog/pricl.biology.htm 3. Educational resource of the Internet. Molec Biology. http://www.alleng.ru./edu/biolog 2.htm	**7,8**
5	Molecular mechanisms of storage, transmission and implementation of genetic information	Essay. Laboratory work	PDF Lectures 1.Molec.biology Navigator for information resources. http: //www.spsl.nsc. 2.ru/win/nelbib/biolog/pricl.biology.htm	**9,10**

			3. Educational resource of the Internet. Molec Biology. http://www.alleng.ru./edu/biolog 2.htm	
6	Synthesis of protein and RNA. Transcription. Translation	Essays. Laboratory work	PDF Lectures 1.Molec.biology Navigator for information resources. http: //www.spsl.nsc. 2.ru/win/nelbib/biolog/pricl.biology.htm 3. Educational resource of the Internet. Molec Biology. http://www.alleng.ru./edu/biolog 2.htm	**11,12**
7	Mode of gene expressions is various and depends on properties of genes. Replication, of DNA repairation.	Essays. Laboratory work	PDF Lectures 1.Molec.biology Navigator for information resources. http: //www.spsl.nsc. 2.ru/win/nelbib/biolog/pricl.biology.htm 3. Educational resource of the Internet. Molec Biology. http://www.alleng.ru./edu/biolog 2.htm	**13,14**
8	Molecular mechanisms of mutagenesis and recombination of genetic material (crossing over and types of mutations)	Essays. Laboratory work.	PDF Lectures 1.Molec.biology Navigator for information resources. http: //www.spsl.nsc. 2.ru/win/nelbib/biolog/pricl.biology.htm 3. Educational resource of the Internet. Molec Biology. http://www.alleng.ru./edu/biolog 2.htm/	**15,16**
9	Type of inheritance	Essays. Laboratory work.	PDF Lectures 1.Molec.biology Navigator for information resources. http: //www.spsl.nsc. 2.ru/win/nelbib/biolog/pricl.biology.htm 3. Educational resource of the Internet. Molec Biology. http://www.alleng.ru./edu/biolog 2.htm/	**17,18**

1.4.3. Evaluative Assessment Tools

Current and milestone (modular) control:

The current control of students' knowledge can be:

- oral questioning;

- solving situational tasks;
- assessment of the development of practical skills on dummies;
- control task; test;
- checking the completion of written homework;
- checking abstracts, reports, presentations.

Current control of students' knowledge **represents**. **Abstract topics:**

Section "Cytology"

1. Medical biology as a science.
2. Definition of the concept of life at the present level of development of biological science. Forms and basic properties of living things.
3. Levels of life organization, their importance for medicine.
4. Cell theory, its current state and importance for medicine. General plan of the structure of the cell.
5. A cell is an elementary structural and functional unit of living things. Pro - and eukaryotic cells.
6. Methods for studying the structure and functioning of cells.
7. The chemical composition of the cell.
8. Cytoplasm. cell organelles
9. Organelles of movement. Inclusions.
10. Cell membranes: chemical composition, structure and function.
11. Membrane transport, its medical significance.
12. The cell as an open system. Organization of flows of substances and energy in the cell. Energy supply of the cell.
13. The structure and functions of the kernel.
14. Chromatin: levels of organization (packaging) of hereditary material. Sex chromatin.
15 The place and tasks of biology in the training of a doctor

Section "Molecular Biology"

1. Chemical composition, features of chromosome morphology. The dynamics of their structure in the cell cycle (interphase and metaphase chromosomes).
2. Polytene chromosomes.
3. Human karyotype.
4. Morpho-functional characteristics and classification of human chromosomes.
5. The importance of studying the karyotype in medicine.
6. Molecular level of organization of hereditary information.
7. Organization of the genome of pro - and eukaryotes.
8. Organization of the flow of information in the cell.
9. Genetic code, its properties.
10. The main stages of protein biosynthesis in the cell. Transcription.
11. Broadcast: initiation, elongation, termination.
12 Realization of genetic information in pro - and eukaryotes. Exon-intron organization of genes in eukaryotes ..

13. Features of the regulation of gene expression in pro - and eukaryotes.
14. Nucleic acids, their structure and function.
15. Genes structural, regulatory, synthesis of tRNA and rRNA. 16. Mobile genetic elements.
17. DNA replication, its meaning.
18. Self-correction and DNA repair.
19.Post-translational transformations of proteins - the basis of their functioning.
20.Processing, splicing

COURSE POLICY AND EVALUATION CRITERIA:

Type of control (current, milestone, final)	**Control form**	**Assessment of learning outcomes**
Attendance	For one missed lesson minus 2 points	20 points
Current control	Oral surveey, written work	20 points
IWS+IWW	Perfoming assignments, work with literature	20 points
Milestone control (modul submission)	Testing, control tasks	40 points
Final control (differential test)	Conversation, examination (test.edu.kg)	100 points

Scale of correspondence between grades and scores on the final control (exam)	
Score	**Grade**
90-100	«excellent»
76-89	«good»
60-75	«satisfactory»
0-59	«unsatisfactory»