ABSTRACT OF THE WORKING PROGRAM OF THE DISCIPLINE "PHYSICS, MATHEMATICS"
for specialty 31.05.01. "General medicine"

1. GOALS AND OBJECTIVES OF MASTERING THE DISCIPLINE

The objectives of the development of the discipline "Physics, mathematics" are:

* Formation of students ' system knowledge about physical properties and physical processes occurring in biological objects, the ability to apply a physical approach and tools to solving medical problems;

* Formation of theoretical knowledge and practical skills of using mathematical apparatus and statistical methods in evidence-based medicine;

* Formation of students ' materialistic worldview and logical thinking on the basis of the natural-scientific nature of the studied material.

Objectives of the discipline:

* Study of the General physical patterns underlying the processes occurring in the body;

* Study of mechanical properties of some biological tissues, physical properties of biological fluids;

* Characteristics of physical factors (environmental, medical, clinical, industrial), disclosure of biophysical mechanisms of their action on the human body;

* Analysis of the physical characteristics of the information on the output of the medical device;

* Study of technical characteristics and purpose of the main types of medical equipment;

* Formation of safety when working with devices and devices.

2. THE PLACE OF DISCIPLINE IN THE STRUCTURE OF THE MAIN EDUCATIONAL PROGRAMS OF HIGHER PROFESSIONAL EDUCATION

Discipline "Physics, mathematics" refers to the "Mathematical, natural science and biomedical cycle" for the development of the discipline "Physics, mathematics" students must have a basic level of knowledge and skills of the school course of physics and mathematics.

The discipline "Physics, mathematics" together with the disciplines of "Mathematical, natural science and medical-biological cycle – normal and pathological physiology, biochemistry, Microbiology and Virology forms students' systemic knowledge about the nature and direction of processes occurring in the human body, revealing their physical essence. The development of the discipline "Physics, mathematics" should precede the study of specialized disciplines in subsequent courses-hygiene, public health and health care, medical rehabilitation, neurology, otorhinolaryngology, ophthalmology, life safety, disaster medicine, radiation diagnosis and radiation therapy, dentistry, traumatology, orthopedics.

This is due to the fact that the subject reveals the fundamental foundations of the use of physical methods in diagnosis and therapy, reveals the application of theoretical knowledge and practical skills of working with medical devices, apparatus, tools.

3. COMPETENCE OF THE STUDENT, FORMED AS A RESULT OF THE DEVELOPMENT OF THE DISCIPLINE (EXPECTED RESULTS OF EDUCATION AND COMPETENCE OF THE STUDENT AT THE END OF THE DEVELOPMENT OF THE PROGRAM OF THE DISCIPLINE) "PHYSICS, MATHEMATICS"

As a result of studying the discipline, the student must:

Know:

- mathematical methods of solving intellectual problems and their application in medicine;

- safety regulations and work in physical laboratories;

- basic laws of physics, physical phenomena and laws underlying the processes occurring in the human body;

- characteristics and biophysical mechanisms of influence of physical factors on the body;

- physical bases of functioning of the medical equipment, the device and appointment of the medical equipment;

- physical and chemical essence of the processes occurring in a living organism at the molecular, cellular, tissue and organ levels;

- physico-chemical methods of analysis in medicine.

Be able to:

- use educational, scientific, popular science literature, the Internet for professional activities;

- use physical equipment;

– work with the magnifying technique;

- to carry out calculations based on the results of the experiment, to carry out elementary statistical processing of experimental data

Posses:

- the concept of limitations in the reliability and specificity of the most common laboratory tests;

– skills on the human head.

Competence content (or its part)	Competence content (or its part)	Competency Index
1	2	3
Know:	ability to abstract thinking, analysis, synthesis **(GC-1)**; readiness for self-development, self-realization, self-education, use of creative potential **(GC-5);** willingness to use first aid techniques, methods of protection in emergency situations **(GC-7).** readiness to solve standard tasks of professional activity with the use of information, bibliographic resources, medical and biological terminology, information and communication technologies and taking into account the basic requirements of information security **(GPC-1)**; ability and willingness to analyze the results of their own activities to prevent professional mistakes **(GPC-5);** readiness to use basic physical and chemical, mathematical and other natural science concepts and methods in solving professional problems **(GPC -7)**; readiness to use medical devices provided by the procedures of medical care (readiness to use basic physical and chemical, mathematical and other natural science concepts and methods in solving professional problems **(GPC-11)** ability and readiness to implement a	GC-1 GC-5 GPC -1 PC -4 PC -18
safety regulations and work in physical laboratories		PC -1 PC -22
the basic laws of physics, physical phenomena and laws underlying the processes		GC -5 GPC -7 PC -22 PC -20
characteristics and biophysical mechanisms of influence of physical factors on the body		GPC -11 OK-7 PC -1
physical bases of functioning of medical equipment, device and medical equipment - chemical methods of analysis in medicine		GC -1 GC -7 GPC-5 GPC -11 PC -1 PC -20 PC -22
physical and chemical essence of the processes occurring in a living organism at the molecular, cellular, tissue levels		GC -1 GC -5 GPC -5 PC -20 PC -1 PC -20
physico-chemical methods of analysis in medicine		GC -1 GC -5 GPC -5

	set of measures aimed at preserving and strengthening health and including the formation of a healthy lifestyle, prevention of the occurrence and (or) spread of diseases, their early diagnosis, identification of the causes and conditions of their occurrence and development, as well as aimed at eliminating the harmful effects on human health factors of the environment **(PC-1)**; ability and readiness to use social and hygienic methods of collecting and medical and statistical analysis of information on health indicators of the population **(PC-4)**; readiness to participate in the assessment of the quality of medical care using basic medical and statistical indicators **(PC-18)**; readiness for analysis and public presentation of medical information on the basis of evidence-based medicine **(PC -20)**; willingness to participate in the introduction of new methods and techniques aimed at protecting the health of citizens **(PC -22)**	GPC -11 PC -1 PC -20
Be able to:		
use educational, scientific, popular science literature, the Internet for professional activities		GC -1 GC -5 GPC -5 PC -1 PC -18 PC -20
use medical devices and physical equipment		GC -1 GPC -7 GPC -11 PC -18
work with magnifying technique		GC -1 PC -1 PC -18
The rule of conducting calculations based on the results of their own activities, and the method of elementary statistical processing		GC -5 GPC -1 PC -22
Posses:		
the concept of limitations in the reliability and specificity of the most common laboratory tests		GC -5 GPC -7 PC -4
microscopy skills		GC -1 GPC -7

4. STRUCTURE AND CONTENT OF THE DISCIPLINE

Section educational disciplines	**Semester**	**Week**	**Types of educational work, including independent work of students and labor intensity (in hours)**				**Forms of the present control of progress (by weeks of a semester) form of intermediate certification (by semesters)**
			Lectures	**Practical lessons**	**Seminars**	**IIndependent Iwork**	
Mathematical statistics with the basics of higher mathematics	I	1-3		6	–	9	Oral survey, report on laboratory work, problem solving, computer testing, presentation of abstracts, performance of creative tasks

Vibrations and waves. Acoustics	I	4-5	2	3	–	6	Oral survey, report on laboratory work, problem solving, computer testing, presentation of abstracts, performance of creative tasks
Flow and properties of liquids.	I	6-7	2	6	–	3	Oral survey, report on laboratory work, problem solving, computer testing, presentation of abstracts, performance of creative tasks
Electrodynamics. Basics of medical electronics	I	8-9	4	9	–	8	Oral survey, report on laboratory work, problem solving, computer testing, presentation of abstracts, performance of creative tasks
Optics. Infrared, ultraviolet radiation	I	11-12	2	9	–	8	Oral survey, report on laboratory work, problem solving, computer testing, presentation of abstracts, performance of creative tasks
Ionizing radiation, dosimetry	I	13-14	2	9	–	6	Oral survey, report on laboratory work, problem solving, computer testing, presentation of abstracts, performance of creative tasks
Physical processes in biological membranes	I	15-16	2	3		6	Oral survey, report on laboratory work, problem solving, computer testing, presentation of abstracts, performance of creative tasks
Total:			14	45		46	

5. SCOPE OF DISCIPLINE AND TYPES OF EDUCATIONAL WORK

The total complexity of the discipline are 3 credit units, 108 hours.

Type of educational work	**Workload**
	1 course
1	**2**
Classroom sessions (Total hours), including:	108
Lectures	14
Seminars	-
Practic work	45
Independent work of the student (IWS), including	46
Type of intermediate certification – exam (test)	3

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