#### FEDERAL STATE BUDGETARY EDUCATIONAL INSTITUTION HIGHER EDUCATION INSTITUTION «DAGESTAN STATE MEDICAL UNIVERSITY» MINISTRY OF HEALTH OF THE RUSSIAN FEDERATION



#### WORKING PROGRAM OF THE DISCIPLINE «MEDICAL INFORMATICS: FUNDAMENTALS OF BIOMEDICAL STATISTICS AND DATA INTERPRETATION IN EVIDENCE-BASED MEDICINE»

Discipline index – **51. O. 13. 02** Specialty (direction): **31.05.01 - General medicine**. The level of higher education **- specialty** Graduate qualification: **Physician** Faculty of **General medicine** Department of **Biophysics, Informatics and medical equipment** Form of training: **full-time** Course: **3** Semester: **6 Total labor intensity (in credits / hours)**: **2 C.U./ 72 hours** contact – **42** hours lectures - **8** hours practical classes - **34** hours independent work of the students - **30** hours form of control: **credit** 

Makhachkala, 2023 y.

The working program of the discipline "**Fundamentals of biomedical statistics** and interpretation of data in evidence-based medicine" was developed in accordance with the Federal State Educational Standard in the field of training (specialty) **31.05.01** - **General medicine**, approved by the Ministry of Education and Science of the Russian Federation Order № 988 of 12.08.2020.

The working program of the academic discipline was approved at the meeting of the Department of Biophysics, Informatics and Medical devices of 12.05.2023 Protocol № 11.

Work program agreed with:

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1. Director of the Library of the DSMU	Ballyc	(V.R. Musaeva)
2. Head of the Department of UMR KCO	Moly	(A.M. Karimova)
3. Dean	m	(R.T. Savzikhanov )

#### **Compilers**:

- 1. M.A. Magomedov Candidate of Physical and Mathematical Sciences, Associate Professor
- 2. A.M. Kurbanova Candidate of Physical and Mathematical Sciences, Associate Professor
- 3. M.A. Magomedova Candidate of Philology Sciences, Associate Professor

#### 1. The reviewer:

E.R. Nagiyev - Head of the General and Biological Chemistry Department of DSMU, Professor

#### 2. The reviewer:

G.M. Magomedov - Head of department of theory and methodology of physics teaching of DSPU, Doctor of Physical and Mathematical Sciences, Professor

#### I. THE PURPOSE AND OBJECTIVES OF THE DEVELOPMENT OF THE DISCIPLINE

**Objective:** to familiarize students with the theoretical and methodological foundations of modern information technologies and the formation of the ability to use modern information technologies to solve professional tasks of a doctor in general hygiene, epidemiology.

#### Tasks:

to form a systematic understanding of the possibilities and advantages of using modern information and digital technologies in the field of professional activity;
to develop the ability to use information technology to solve educational and applied problems;

- to develop skills of working with software tools for the effective solution of educational and applied tasks.

#### II. PLANNED RESULTS OF TRAINING IN THE DISCIPLINE Formed in the process of studying the discipline competence FSES 3++

Code and name of the competence (or part thereof)			
Code and name of the comp	etence achievement indicator		
General professiona	l competencies (GPC)		
<b>GPC-11.</b> Capable of preparing and applying scientific, scientific-production, design, organizational, managerial and regulatory documentation in the healthcare system	<b>CAI-1</b> . Prepares and applies scientific, scientific and production documentation		
<ul> <li>Know: modern communication technologies, for academic and professional interaction.</li> <li>Be able to: search and select scientific, regulatory and organizational and administrative documentation in accordance with the set goals, their analysis and application for solving professional tasks.</li> <li>Possess: modern information and communication technologies for professional interaction.</li> </ul>			
<b>GPC-10.</b> He is able to understand the principles of modern information technologies and use them to solve the tasks of professional activity.	<b>CAI-1.</b> Understands the principles of modern information technologies (interactive mode, integration, flexibility of change processes).		
of professional activity. <b>To know:</b> the principles of modern information technologies and use them to solve the tasks of professional activity, the general characteristics of the processes of collecting, storing, processing and transmitting information in the field of professional activity; the main means and methods of ensuring information security when working with various sources of information. <b>Be able to:</b> carry out an effective search and use information resources for professional activities, rationally choose and use information technologies to effectively solve tasks; analyze and evaluate information sources, information protection. <b>Possess</b> : the principles of modern information technologies (interactive mode, integration, flexibility of change processes), the basic technologies of information retrieval in solving problem situations; technologies for collecting, storing and processing information, taking into account the basic requirements of information security.			

### III. THE PLACE OF DISCIPLINE IN THE STRUCTURE OF THE EDUCATIONAL PROGRAM

The discipline "*Fundamentals of biomedical statistics and interpretation of data in evidence-based medicine*" belongs to the mandatory part of the Block1 of the discipline (modules) **51. O. 15. 02** of the curriculum in the specialty *31.05.01 General medicine*.

The preceding ones, on which the discipline is directly based "Fundamentals of biomedical statistics and interpretation of data in evidence-based medicine", is a school course "Informatics and ICT".

# IV. THE SCOPE OF THE DISCIPLINE AND TYPES OF ACADEMIC WORK

#### The total labor intensity of the discipline is 4 credits.

Type of educational work	Total	Semestr
Type of educational work	hours	5
Contact work of students with the teacher	72	70
Contact work of students with the teacher	12	12
Classroom classes (total)	42	42
Including:		
Lectures (L)	8	8
Practical training (PT)	34	34
Independent work of the student (IWS)	30	30
Type of intermediate certification (exam)	2, test	2, test
Total labor intensity:		
hours	72	72
of credits	2	2

#### V. THE CONTENT OF THE ACADEMIC DISCIPLINE

# **5.1.** Sections of the discipline and competencies that must be mastered during their study

Section No.	Name of the discipline section	Section content	Code of the controlled competence (or part of it)
1	2	3	4
1	Evidence- based medicine. Principles of evidence- based medicine.	Evidence-based medicine. Definition of evidence. Aspects of evidence-based medicine. Conditions for the effective functioning of evidence-based medicine. The purpose is analysis and its types. Epidemiological indicators in the study of non-communicable diseases. Epidemiological characteristics of disease risk.	CAI-1 GPC-11 CAI-1 GPC-10
2	Analysis of medical data using mathematical statistics	Basic concepts of mathematical statistics. Statistical distribution. Statistical distribution characteristics: absolute and relative distribution frequencies, histogram, polygon. Position characteristics and variations. Estimation of the parameters of the general population.	CAI-1 GPC-11 CAI-1 GPC-10
3	Statistical processing of biomedical research using MS Excel	Primary statistical processing of quantitative features. Characterization of biological objects as complex stochastic systems. The selective method of observation is the main method of scientific research. Tasks of statistical description of variables. Evaluation of the accuracy and reliability of numerical characteristics. The law of the normal distribution of a random variable. Determination of the statistical series of the distribution of a random variable based on the results of a sample observation. Primary statistical processing of medical experiment data. Testing the hypothesis of the normality of the distribution of a random variable using the Pearson agreement criterion in Excel.	CAI-1 GPC-11 CAI-1 GPC-10

4	Statistical analysis of categorized data	Statistical indicators in medicine and their comparison. Parametric and nonparametric criteria. Relative values in medical statistics. Evaluation of the significance of the difference in the relative values of frequency in independent samples according to Pearson's $\chi^2$ – criterion. Nonparametric methods for assessing the significance of differences. The Wald-Wolfowitz series criterion, the Mann-Whitney U-criterion, and the Kolmogorov-Smirnov two-sample criterion.	CAI-1 GPC-11 CAI-1 GPC-10
5	Statistical analysis of biomedical data using the Statistica package	The main tasks of the analysis of biomedical data. Analysis of qualitative and quantitative data. Statistics as a science. The role of statistics in the professional activity of a doctor. Basic concepts of evidence-based medicine. Research planning. Description of qualitative features. Characteristic of the normal distribution. Scientific and statistical hypotheses, $H_0$ and $H_1$ . Classification of statistical analysis methods. The significance of the biological or clinical interpretation of the data obtained. Brief description of the Statistica and SPSS packages.	CAI-1 GPC-11 CAI-1 GPC-10
6	Single-factor correlation and regression analysis of medical research data	The essence of the functional and correlation relationship. Correlation coefficient and its properties. Assessment of the significance of the correlation coefficient. Estimation of the accuracy and reliability of the correlation coefficient by the Fisher auxiliary variable. Rank correlation coefficients. Coefficient and regression equation. Evaluation of the significance of the coefficients of the regression equation. Analysis of variance, evaluation of the informativeness and significance of the regression equation. Prediction by the regression equation and assessment of its significance and reliability. Features of the construction of nonlinear regression equations.	CAI-1 GPC-11 CAI-1 GPC-10

7	Computer	Computer implementation of one- and	CAI-1 GPC-11
	modeling for	two-chamber pharmacokinetic models.	CAI-1 GPC-10
	solving	Compartmental modeling Chamber	
	nharmacokinetics	models of pharmacokinetics Single-	
	phalmacokineties	showh or the amagaal in stig model of	
	problems		
		intravenous administration. Description	
		of the process of intravenous	
		administration of the drug. Scheme of a	
		single-chamber pharmacokinetic model.	
		Mathematical description of a single-	
		chamber pharmacokinetic model of	
		intravenous administration.	
		Mathematical description of a two-	
		chamber pharmacokinetic model of	
		intramuscular injection. Creation of a	
		computer pharmacokinetic model of	
		periodic intravenous administration for	
		patients with different body weight and	
		varying degrees of impairment of renal	
		excretory function. Integrated	
		and minimal models.	

### **5.2.** Discipline sections and labor intensity by type of academic work

No		Types of academic work, hour.			hour.
tion		class	room	extracurricular	Total
Sect	Name of the discipline section	L	РТ	IWS	hours
1	2	4	5	6	7
1.	Evidence-based medicine. Principles of evidence-based medicine.	1	4	6	11
2.	Analysis of medical data using mathematical statistics	1	6	4	11
3	Statistical processing of biomedical research using MS Excel	1	4	4	9
4	Statistical analysis of categorized data	1	4	4	9
5	Statistical analysis of biomedical data using the Statistica package	1	6	4	11
6	Single-factor correlation and regression analysis of medical research data	1	4	4	9
7	Computer modeling for solving pharmacokinetics problems	2	6	4	12
	TOTAL:	8	34	30	72

### 5.3. Thematic plan of lectures

Nº	Topics of lectures	Number of hours per semester
1	Features and general principles of statistical analysis of biomedical	2
	data.	
2	Analysis of medical data using mathematical statistics methods	2
3	Data mining. Data Mining technology. Evidence-based medicine.	2
4	Computer modeling for solving pharmacokinetic problems.	2
	Computer implementation of one- and two-chamber	
	pharmacokinetic models.	
	TOTAL:	8

### 5.4. Thematic plan of practical classes

Nº	Discipline section	The name of the topics of practical classes	Forms of current control	Number of hours per semester
1	2	3	4	5
1	Evidence-based medicine. Principles of evidence-based medicine.	1. Evidence-based medicine. Principles of evidence-based medicine.	PT,T	2
	Analysis of medical data using	2. Probability theory. Random events.	РТ	2
2	mathematical statistics	3. Probability theory. Random variables.	РТ	2
3	Statistical processing of biomedical research using MS Excel	4. Statistics. The study of one random variable. Selective method.	PT,T	4
		5. Statistical verification of statistical hypotheses. Determination of the correspondence of the sample to the normal distribution (Pearson's criterion of agreement).	PT,T	4
4	Statistical analysis of categorized data	<ul> <li>6. Comparison of two samples.</li> <li>Parametric criteria.</li> <li>a) comparison of two independent samples (their variances, their averages in the case of large samples; averages in the case of small samples);</li> <li>b) comparison of the averages of two dependent samples.</li> </ul>	PT,T	4
5	Statistical analysis of biomedical data	7. One-factor analysis of variance.	PT,T	2

	using the Statistica package	8. Correlation and regression analysis.	PT	4
6	Single-factor correlation and regression analysis of medical research data	9. Time series analysis.	PT	4
7	Single-factor correlation and regression analysis of medical research data	<ul> <li>10. Computer modeling for solving pharmacokinetic problems:</li> <li>a) Construction of one- and two-chamber models of pharmacokinetics.</li> <li>b) Choosing the optimal mode of intravenous administration of the drug Fortazim to patients with equal body weight and different state of the excretory system (with different values of total clearance).</li> <li>c) Creation of a computer pharmacokinetic model of periodic internal administration for patients with different swith different body weight and varying degrees of impairment of renal excretory function.</li> </ul>	PT, ST	
	Intermediate control		test	2
	TOTAL			34

PT - Practical Training, T - Tests, I - Interview, ST - Situational Tasks.

# 5.5. Educational and methodological support for independent work in the discipline

#### 5.5.1. Independent work of a student in the discipline "Fundamentals of biomedical statistics and interpretation of data in evidencebased medicine"

N⁰	Name of the discipline section	Types of IWS	Labor intensity (hour)	Forms of control
1	2	3	4	5
1	Evidence-based medicine. Principles of evidence-based medicine of biomedical research.	Study of educational and scientific literature. Preparation for a practical lesson. Working with lecture material.	6	Т

	TOTAL in the semester:		30	)
7	Computer modeling for solving pharmacokinetic problems.	Study of educational and scientific literature. Working with lecture material. Preparation for a practical lesson.	4	РТ
6	Single-factor correlation and regression analysis of medical research data	Study of educational and scientific literature. Working with lecture material. Preparation for a practical lesson. Solving tasks issued on the PT.	4	ST, PT, T
5	Statistical analysis of biomedical data using the Statistica package	Study of educational and scientific literature. Working with lecture material. Preparation for a practical lesson.	4	PT, T
4	Statistical analysis of categorized data	Study of educational and scientific literature. Working with lecture material. Preparation for a practical lesson.	4	PT, T
3	Statistical processing of biomedical research using MS Excel	Study of educational and scientific literature. Working with lecture material. Preparation for a practical lesson.	4	PT, T
2	Analysis of medical data using mathematical statistics	Study of educational and scientific literature. Preparation for a practical lesson. Working with lecture material. Writing an abstract.	4	PT, T

PT - Practical Training, T - Tests, ST - Situational Tasks.

### 5.5.2. Subject of abstract works

N⁰	Chapter	Topics of abstracts
1	Evidence-based medicine. Principles of evidence-based	Epidemiological indicators in the study of non- communicable diseases.
	medicine of biomedical research.	Epidemiological characteristics of disease risk.
2	Analysis of medical data using mathematical statistics	Medical statistics. Database of statistical reports

#### VI. EVALUATION TOOLS FOR THE ONGOING MONITORING OF ACADEMIC PERFORMANCE AND INTERMEDIATE CERTIFICATION BASED ON THE RESULTS OF THE DISCIPLINE (Appendix 1)

# 6.1. Ongoing monitoring of academic performance6.1.1. List of competencies indicating the stages of their formation in the process of mastering the work program of the discipline.

Section N <sup>o</sup>	Name of the discipline section	Code of the controlled competence (or part of it)	Forms of control
1	2	3	4
1	Evidence-based medicine. Principles of evidence-based medicine of biomedical research.	CAI-1 GPC-11 CAI-1 GPC-10	Practical Training, Tests, Interview, Situational Tasks, Report
2	Analysis of medical data using mathematical statistics	CAI-1 GPC-11 CAI-1 GPC-10	PT, T, I, ST, R
3	Statistical processing of biomedical research using MS Excel	CAI-1 GPC-11 CAI-1 GPC-10	PT, T, I, ST, R
4	Statistical analysis of categorized data	CAI-1 GPC-11 CAI-1 GPC-10	PT, T, I, ST, R
5	Statistical analysis of biomedical data using the Statistica package	CAI-1 GPC-11 CAI-1 GPC-10	PT, T, I, ST, R
6	Single-factor correlation and regression analysis of medical research data	CAI-1 GPC-11 CAI-1 GPC-10	PT, T, I, ST, R
7	Computer modeling for solving pharmacokinetic problems.	CAI-1 GPC-11 CAI-1 GPC-10	PT, T, I, ST, R

### 6.1.2. Examples of evaluation tools for current performance monitoring

#### QUESTIONS OF TEST CONTROL OF ACADEMIC PERFORMANCE Codes of controlled competencies: CAI-1 GPC-11, CAI-1 GPC-10.

### Option 1.

#### 1. What is a model?

a. it is such a material or mentally imagined object that is replaced by a real object in the process of research.

b. it is such a material or mentally imagined object that replaces the real object (the original object) in the process of research so that its direct study gives new knowledge about the object- original.

c. substitution of the object under study.

d. study of an artificial object.

#### 2. Modeling is...

a. the process of building models.

b. replacing a real object with an artificial one.

c. the process of building, studying and applying models.

d. the process of applying models.

### 3. Which models are most often used in biology and medicine?

a. biological, physic-chemical, informational, mathematical.

b. informational, mathematical.

c. mathematical and biological d. physical and electrical.

d. biological and physical.

#### 4. Definition of a mathematical model?

a. description of any class of objects or phenomenon.

b. description of any class of objects or phenomenon using mathematical symbols.

c. mathematical formulas and equations.

d. physical description of the object.

e. creating a diagram of the object under study.

# 5. What types of mathematical models do you know about describing changes in processes over time?

a. dynamic and statistical.

b. static and statistical.

- c. dynamic and static.
- d. dynamic and differential.
- e. differential and integral.

#### 6. Static models are described by ...

- a. differential equations.
- b. integral equations.
- c. partial differential equations.
- d. algebraic equations.

e. algebraic and differential equations.

#### 7. Dynamic models are described...

- a. algebraic equations.
- b. integral equations.
- c. partial differential equations.
- d. differential equations.
- e. algebraic and differential equations.

#### 8. What models do you know depending on the range of tasks to be solved?

- a. minimum and maximum.
- b. integrated and differentiated.
- c. maximal and differentiated.
- d. maximal and integrated.
- e. minimal and integrated.

#### 9. Integrated models ....

a. have a practical orientation.

b. have a theoretical nature and are aimed at deciphering the structure of the system, the principles of its functioning.

c. have a theoretical nature and a practical orientation.

d. are used, for example, to obtain specific recommendations.

for an individual patient or a group of homogeneous patients.

#### 10. Minimal models....

a. have a theoretical nature and are aimed at deciphering the structure of the system, the principles of its functioning.

b. have a theoretical nature and a practical orientation.

c. have a practical orientation. In medicine, they are used, for example, in order to obtain specific recommendations for an individual patient or a group of homogeneous patients.

d. they are aimed at deciphering the structure of the system, the principles of its functioning, and assessing the role of specific regulatory mechanisms.

#### 11. Approaches for constructing mathematical models:

a. empirical and experimental.

- b. Experimental and theoretical.
- c. theoretical and mathematical.
- d. integral and differential.
- e. theoretical and integral.

#### 12. The "black box" method is ...

a. description of living systems in terms of input - state - output.

- b. description of living systems in terms of input- output.
- c. description of living systems in terms of input state.

d. description of living systems in terms of state - output.

e. description of living systems in terms of output – output.

#### 13. The compartment is ...

a. a certain amount of substance released in a biological system.

b. a certain amount of substance released in a biological system and having the

property of unity, released in a biological system and not having the property of unity.

c. a certain amount of substance.

d. a certain amount of substance released in a biological system and having the property of unity.

# 14. In which discipline are compartment and chamber models most often used?

a. in pharmacology

b. in biology.

c. in pharmacodynamics.

d. in pharmacokinetics.

e. in physiology.

#### 15. The apparent volume is ...

a. the entire volume of blood.

b. the entire volume of interstitial fluid.

c. such a hypothetical volume in which it would be necessary to dissolve the injected amount of the drug so that its concentration would be equal to the concentration actually observed in the blood.

d. the volume of a particular organ.

#### 16. Clearance is ...

a. the amount of plasma released (purified) from the drug per unit of time.

b. the rate of excretion of the substance.

c. the rate of administration of the substance.

d. the total rate of excretion of all substances from the body.

#### **17.** The minimum therapeutic concentration is ...

a. the minimum concentration of the drug, above which the drug begins to have a toxic effect.

b. the concentration of the drug, above which the drug ceases to have a therapeutic effect.

c. the concentration of the drug, below which the drug begins to have a toxic effect.

d. the minimum concentration of the drug, below which the drug ceases to have a therapeutic effect.

#### **Evaluation criteria of the current progress control (tests):**

- ✓ "Excellent": 91-100%
- ✓ "Good": 81-90%
- ✓ "Satisfactory": 71-80%
- ✓ "Unsatisfactory": <70%.

#### SITUATIONAL TASKS BY DISCIPLINE SECTIONS Section № 3. "Statistical processing of biomedical research using MS Excel"

Codes of controlled competencies: AIC-1 GPC-11, AIC-1 GPC-10.

**TASK 1**. In the city of N. in 2019, 1,100 cases of dysentery, 1,300 measles, 500 scarlet fever, 150 whooping cough, 480 infectious hepatitis, 10 diphtheria and 1,790 other infections were registered. Using the MS Excel functions, calculate the indicator of the structure of infectious morbidity.

*TASK 2*. During the analysis of the morbidity of children in the children's polyclinic at site No. 2, the following data were obtained: 740 children in total. Registered diseases: 975 including: dysentery 18 influenza 405 pneumonia 19 acute respiratory infections 278 etc. ill. 255 Using MS Excel functions to determine the structure and incidence of children, including nosological forms.

#### TASK 3. In city N: Population – 500,000 people; born

- 4400 people; died – 7000 people, children who died before 1 year – 96 people; in maternity hospitals of the city: 4400 people were born alive; Among children who died under the age of 1 year, there were 40 people who died from newborn diseases; from respiratory system diseases – 30 people; from gastrointestinal diseases- intestinal tract – 16 people; from congenital anomalies – 6 people; from other causes – 4 people. Based on the presented data, using the MS Excel functions, calculate and evaluate the following demographic indicators: fertility, mortality, natural growth, infant mortality, the indicator of the structure of the causes of infant mortality (separately for each cause).

# *Evaluation criteria for the current monitoring of academic performance (situational tasks):*

- "Excellent": The answer to the problem question is correct. The explanation of the course of its solution is detailed, consistent, competent, with theoretical justifications (including from the lecture course), with the necessary schematic images, the answers to the questions are correct, clear.
- "Good": The answer to the problem question is correct. The explanation of the course of its solution is detailed, but not logical enough, with single errors in details, some difficulties in theoretical justification (including from lecture material), in schematic images, with single errors in the solution; the answers to the questions are correct, but not clear enough.
- "Satisfactory": The answer to the problem question is correct. The explanation of the course of its solution is not complete enough, inconsistent, with errors, weak theoretical justification (including lecture material), with significant difficulties and errors in schematic images, answers to questions are not clear enough, with errors in details.

• "Unsatisfactory": The answer to the problem question is incorrect. The explanation of the course of its solution is incomplete, inconsistent, with gross errors, without theoretical justification (including lecture material); the answers to the questions are incorrect (or absent).

#### 6.2. Interim certification based on the results of the discipline development

#### 6.2.1. The form of intermediate certification is a credit. Semester 5

#### 6.2.2. The procedure for conducting interim certification.

#### The test is conducted orally in the form of a ticket interview. 6.2.3. Examples of questions for exam preparation.

1. Features and general principles of statistical analysis of biomedical data. The structure of medical research.

2. Transverse and longitudinal medical studies. Prospective studies. Retrospective studies and their advantages.

3. Quantities and variables are basic concepts. Dependent and independent variables. Measurement scales.

4. Evidence-based medicine. Methodological basis of evidence-based medicine.

5. Name and give a comparative description of the main types of clinical trials.

- 6. Describe the main stages of clinical trials.
- 7. ....

8. .....

#### 6.2.4. Sample ticket.

FSBEI HE DSMU of the Ministry of Health of Russia

Department of Biophysics, Computer Science and Medical Equipment Specialty (direction) Medical business Discipline Medical Informatics

#### **QUESTIONS FOR THE OFFSET TICKET No. 1**

1. What is medical informatics? What is the object and subject of its study?

2. The concept of information. Types of medical information.

3. Data input, editing, formatting and calculations in MS Excel. Automation of data entry. Using complex formulas and standard functions.

Approved at the meeting of the department, Protocol No. \_1 dated "\_31\_" 08 2023 y.

Head of the department: Abdulgalimov R.M., PhD, Professor

Compiled by: Kurbanova A.M., Candidate of Phys. and Math. Sciences

# 6.2.5. The system of evaluation of the results of mastering the discipline (module), description of the evaluation scales, grading.

The assessment system includes a credit.

When conducting intermediate certification in the form of a set-off, an assessment scale is used (by levels - to know, to be able, to own): "failure", "set-off".

Evaluation	Evaluation criteria				
indicators "not credited" "not credited"		"not credited"			
	Competence code AIC-1 GPC-10				
to know	The student does not know modern communication technologies for academic and professional interaction.	The student knows modern communication technologies for academic and professional interaction			
to be able	The student does not know how to search and select scientific, regulatory and organizational and administrative documentation in accordance with the set goals, their analysis and application for solving professional tasks.	The student is able to search and select scientific, regulatory and organizational and administrative documentation in accordance with the set goals, their analysis and application for solving professional tasks.			
to possess	The student does not possess modern information and communication technologies for professional interaction.	The student possesses modern information and communication technologies for professional interaction.			
	Competence code AIC-1	GPC-11			
to know	The student is not able to independently identify the main provisions in the studied material of the discipline. Does not know and does not understand a significant or major part of modern research in the field of information technology.	The student is able to independently identify the main points in the studied material. Knows the basics of modern information technologies and information security in professional activity.			
to be able	The student does not know how to use modern information resources and artificial intelligence systems to carry out professional activities	The student is able to use the acquired knowledge of modern information resources for the implementation of professional activities.			
to possess	The student does not have practical skills of working with Information databases, including the Unified State Information System in the field of healthcare.	The student has sufficient skills to work with information databases, including the Unified State Information System in the field of healthcare and specialized software.			

#### VII. EDUCATIONAL, METHODOLOGICAL AND INFORMATIONAL SUPPORT OF THE DISCIPLINE

#### 7.1. Basic literature

Pr		
N⁰	Name	Number of copies in the library
1	Magomedov M.A., Kurbanova A.M., Magomedova M.A. Fundamentals of medical and biological statistics. Educational aid. ИПЦ ДГМУ, Махачкала, 2022.	30
2		

#### **Electronic publications:**

N⁰	Publication
1	Primer of biostatistics : Glantz, Stanton A : Free Download, Borrow, and Streaming :
	Internet Archive
2	Омельченко, В. П. Медицинская информатика: учебник / В. П. Омельченко, А.
	А. Демидова Москва: ГЭОТАР-Медиа, 2016 528 с ISBN 978-5-9704-3645-5.
	-Текст:электронный
	// URL: http://www.studmedlib.ru/book/ISBN9785970436455.
3	Омельченко В. П. Медицинская информатика. Руководство к
	практическим занятиям: учебное пособие / В. П. Омельченко, А. А. Демидова
	- Москва: ГЭОТАР-Медиа, 2018 384 с ISBN 978-5-9704-4422-1 Текст:
	электронный // URL: http://www.studmedlib.ru/book/ISBN9785970444221

#### 7.1. Additional literature

#### **Printed sources:**

Nº	Name of the publication	Number of copies in the library
1	Омельченко, В.П. Информатика для врачей: учебное пособие / В.П. Омельченко, Н.А. Алексеева. – Ростов н/Д: Феникс, 2015. – 702 с. ил. – (Высшее медицинское образование) ISBN 978-5-222- 23842:1000-00	1
2	Медицинская информатика: учебник / под ред. Т.В.Зарубиной, Б.А. Кобринского. – Москва: ГЭОТАР-Медиа, 2016. – 512 с.: ил. ISBN 1500-00	1
3	Практикум по информатике: учебное пособие для студентов медицинских вузов / М.А. Магомедов, М.А. Ризаханов. – Махачкала: ИПЦ ДГМУ, 2018. – 257 с. ISBN 500-00	4
4	Герасимов А.Н. Медицинская статистика: учебное пособие / А.Н. Герасимов. – Москва: ООО «Медицинское информационноеагентство» - 2007. – 480 с.: ил. ISBN 5-89481- 456-1:420-00	7

### **Electronic publications:**

N⁰	Name of the publication
1	Царик, Г. Н. Информатика и медицинская статистика / под ред. Г. Н.Царик -
	Москва: ГЭОТАР-Медиа, 2017 304 с ISBN 978-5-9704-4243-2
	Текст: электронный //URL:
	http://www.studmedlib.ru/book/ISBN9785970442432.html
2	Омельченко, В. П. Информатика. Практикум / Омельченко В. П., Демидова А.
	А Москва: ГЭОТАР-Медиа, 2016 336 с ISBN 978-5-9704-3950-0 Текст:
	электронный // URL: Информатика. Практикум (studentlibrary.ru)
3	Омельченко, В. П. Информатика / В. П. Омельченко, А. А. Демидова -
	Москва: ГЭОТАР-Медиа, 2016 384 с ISBN 978-5-9704-3752-0 Текст:
	электронный // URL: http://www.studmedlib.ru/book/ISBN9785970437520.html

### 7.1. Resources of the Internet information and telecommunication network

N⁰	Name of the resource		
1	<u>https://готовкцифре.pф/</u> - the portal is an aggregator of services for		
	testing the level of digital literacy, teaching safe and effective work with		
	digital technologies.		
2	https://online.edu.ru/public/promo - Federal Portal "My education".		

#### 7.1. Information technology.

#### List of licensed software:

1. WINDOWS 10 operating system.

2. MS OFFICE 2016 application software package consisting of: Word word processor, Excel spreadsheet processor, an environment for creating PowerPoint presentations.

#### List of information reference systems:

1. Digital educational Environment (DSP) of DSMU. URL: <u>https://lms.dgmu.ru</u>

2. Student consultant: electronic library system. URL: <u>http://www.studentlibrary.ru</u> Access mode: by login and password.

3. Doctor's consultant: electronic library system. URL: <u>http://www.rosmedlib.ru</u> Access mode: by login and password.

4. Federal Electronic Medical Library (FEMB). URL: <u>http://feml.scsml.rssi.ru</u>

5. Scientific electronic library eLibrary. GKD <u>http://elibrary.ru/defaultx.asp</u>

6. Medical reference and information system. URL: http://www.medinfo.ru/

7. CyberLeninka Scientific Electronic Library. URL: <u>http://cyberleninka.ru</u>

8. The RFBR Electronic Library. URL: http://www.rfbr.ru/

9. All-Russian educational Internet program for doctors. URL: http://www.internist.ru

### VIII. MATERIAL AND TECHNICAL SUPPORT

N	Type of room with a number (classroom, laboratory, computer lab, etc.) indicating the address (location) of the building, clinical base, structure, facilities, premises, area of the room, its purpose	Name of the equipment	
	For practical train	ning	
1.	$№3 - 42,25 m^2$ (44 Imam Shamil Avenue, 3rd floor.)	Personal computers with Windows 10 and MS Office 2016 – 16 pcs.	
2.	$N_{0}4 - 42,25 \text{ m}^2$ (44 Imam Shamil Avenue, 3rd floor.)	Personal computers with Windows 10 and MS Office 2016 – 16 pcs.	
3.	$№5 - 50 m^2$ (44 Imam Shamil Avenue, 3rd floor.)	Personal computers with Windows 10 and MS Office 2016 – 20 pcs.	
4.	$№7 - 39 m^2$ (44 Imam Shamil Avenue, 3rd floor.)	Personal computers with Windows 10 and MS Office 2016 – 16 pcs.	
5.	$№8 - 40 m^2$ (44 Imam Shamil Avenue, 3rd floor.)	Personal computers with Windows 10 and MS Office 2016 – 19 pcs.	
6.	$№9 - 40 m^2$ (44 Imam Shamil Avenue, 3rd floor.)	Personal computers with Windows 10 and MS Office 2016 – 19 pcs.	
	For lectures		
1.	Зал №1 – 270 m <sup>2</sup> (44 Imam Shamil Avenue, 1- st floor.)	Electronic presentation. Samsung Laptop; Epson EB-X02 Projector; Canon MF 231.	
2.	Зал №2 – 270 m <sup>2</sup> (44 Imam Shamil Avenue, 1- st floor.)	Electronic presentation. Samsung Laptop; Epson EB-X02 Projector; Canon MF 231.	
3.	Зал №3 – 270 m <sup>2</sup> (44 Imam Shamil Avenue, 1- st floor.)	Electronic presentation. Samsung Laptop; Epson EB-X02 Projector; Canon MF 231.	
4	Reading rooms for independent work.	1, Aliev Street. Biocorpus, DSMU Scientific Library.	

#### IX. METHODOLOGICAL SUPPORT OF THE DISCIPLINE.

Methodological support of the discipline is developed in the form of a separate set of documents: "Methodological recommendations for lectures", "Methodological recommendations for practical classes", "Methodological recommendations for students" in the form of an appendix to the work program of the discipline (module).

#### X. FEATURES OF THE ORGANIZATION OF TRAINING IN THE DISCIPLINE FOR THE DISABLED AND PERSONS WITH DISABILITIES

#### Education of the disabled and persons with disabilities

If necessary, it is carried out by the department on the basis of an adapted work program using special teaching methods and didactic materials compiled taking into account the peculiarities of psychophysical development, individual capabilities and health status of such students (student).

# **10.1.** In order to master the curriculum of the discipline by persons with disabilities and persons with disabilities, the department provides:

- 1) for the disabled and persons with visual disabilities:
  - placement in places accessible to students who are blind or visually impaired and in an adapted form of reference information about the schedule of training sessions;
  - the presence of an assistant providing the student with the necessary assistance;
  - release of alternative formats of teaching materials (large font or audio files);
- 2) for the disabled and persons with hearing disabilities:
  - proper audio media reproduction of information;
- 3) for the disabled and persons with disabilities who have disorders of the musculoskeletal system:

• the possibility of unhindered access of students to study rooms, restrooms and other premises of the department. In case of impossibility of unhindered access to the department, organize the educational process in a specially equipped center for individual and collective use of special technical means of education for the disabled and persons with disabilities (A.Aliyev str. 1, biological building, 1st floor).

Education of students with disabilities can be organized both jointly with other students and in separate groups.

# The list of educational and methodological support for independent work of students in the discipline.

Educational and methodological materials for independent work of students from among the disabled and persons with disabilities are provided

in forms adapted to the limitations of their health and perception of information:

Categories of students	Forms
with hearing impairment	<ul><li> in printed form;</li><li> in the form of an electronic document;</li></ul>
With visual impairment	<ul> <li>in printed form in enlarged font;</li> <li>in the form of an electronic document;</li> <li>in the form of an audio file;</li> </ul>
With a violation of the musculoskeletal system	<ul><li>printed form;</li><li>in the form of an electronic document;</li></ul>

This list can be specified depending on the contingent of students.

# **10.1.** The Fund of evaluation funds for the interim certification of students in the discipline.

**10.1.1.** The list of evaluation funds correlated with the planned results of the development of the educational program.

For students with disabilities

Categories of students	Types of evaluation tools	Forms of control and evaluation of learning outcomes
Hearing impaired	test	mainly written verification
With visual impairment	interview	mainly oral verification (individually)
With a violation of the musculoskeletal system	solution of distance	organization of control in the EIOS DSMU, written verification

Students belonging to the category of persons with disabilities and persons with disabilities, the time for preparing answers to the test increases, preparation for the test using distance educational technologies is allowed.

# **10.1.1.** Methodological materials defining the procedures for assessing knowledge, skills, and (or) experience of activity, characterizing the stages of competence formation.

When carrying out the procedure for evaluating the learning outcomes of disabled people and persons with disabilities, it is envisaged to use the technical means necessary for them in connection with their individual characteristics.

The procedure for evaluating the learning outcomes of disabled people and

persons with disabilities in the discipline provides for the provision of information in forms adapted to the limitations of their health and perception of information:

For people with visual impairments:

- in printed form in enlarged font;
- in the form of an electronic document;
- in the form of an audio file.

For people with hearing impairments:

- in printed form;
- in the form of an electronic document.

For persons with disorders of the musculoskeletal system:

- in printed form;
- in the form of an electronic document;
- in the form of an audio file.

This list can be specified depending on the contingent of students. When carrying out the procedure for evaluating the learning outcomes of disabled people and persons with disabilities in the discipline (module), the following additional requirements are met, depending on the individual characteristics of the students:

1. instructions on the procedure for conducting the assessment procedure are provided in an accessible form (orally, in writing, orally using the services of a sign language interpreter);

an accessible form of providing tasks with evaluation tools (in printed form, in printed form in enlarged font, in the form of an electronic document, tasks are read out by an assistant, tasks are provided using sign language translation);
 an accessible form of providing answers to tasks (written on paper, a set of answers on a computer, using the services of an assistant, orally).

If necessary, for students with disabilities and the disabled, the procedure for evaluating the results of training in the discipline (module) can be carried out in several stages.

The procedure for evaluating the learning outcomes of disabled people and persons with disabilities is allowed using distance learning technologies.

### 10.1. The list of basic and additional educational literature necessary for the development of the discipline.

For the development of the discipline by disabled people and persons with disabilities, basic and additional educational literature is provided in the form of an electronic document in the library's collection and / or in electronic library systems. And also special textbooks and teaching aids, other educational literature and special technical means of collective and individual use, as well as sign language interpreters and typhoid interpreters are provided free of charge.

### 10.1. Methodological guidelines for students on the development of the discipline

Individual work is of great importance in the development of the discipline by disabled people and persons with disabilities. Individual work means two forms of interaction with the teacher: individual educational work (consultations), i.e. additional explanation of the educational material and in-depth study of the material with those students who are interested in it, and individual educational work. Individual consultations on the subject are an important factor contributing to individualization teaching and establishing educational contact between the teacher and students with disabilities or students with disabilities.

### **10.1.** Description of the material and technical base necessary for the implementation of the educational process in the discipline

The development of the discipline by disabled people and persons with disabilities is carried out using general and special purpose teaching tools:

- lecture hall - multimedia equipment, mobile radio class (for students with hearing impairments); power supplies for individual technical means;

- classroom for practical classes (seminars) multimedia equipment, mobile radio class (for students with hearing impairments);

- classroom for independent work - standard workstations with personal computers; a workplace with a personal computer, with a screen access program, a screen magnification program and a Braille display for students with visual impairment.

In each classroom where disabled people and persons with disabilities study, an appropriate number of places for students should be provided, taking into account their health limitations.

	WP updated at the meeting of the department		
List of additions and changes made to the work program of the discipline	Date	Number of the minutes of the meeting of the department	Signature of the head of the department

### **XI. CHANGE SHEET**