№ЛД-21 ИН

Federal State Budgetary Educational Institution higher education
"NORTH-OSSETIAN STATE MEDICAL ACADEMY"
Ministry of Health of the Russian Federation

ДОКУМЕНТ ПОДПИСАН
ЭЛЕКТРОННОЙ ПОДПИСЬЮ

Сертификат:
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Владелец: Ремизов Олег Валерьевич
Действителен: с 23.05.2023 до 15.08.2024

APPROVED
Rector
O.V.Remizov
May 24, 2023

WORKING PROGRAMM OF EDUCATUANAL DISCIPLINE

Digital technologies in medicine

the main professional educational program of higher education –
the specialty program in the specialty **31.05.01 Medical care**,
approved on 24.05.2023

Form of education **Full-time**

Term of training **6 years**

Department **Chemistry and physics**

Vladikavkaz, 2023y

When developing a discipline program, the program includes:

1. Federal State Education Standard on specialty **05.31.01 Medical case** approved by the Ministry of Education and Science of the Russian of Federation of August 12, 2020 y, No988
2. The curriculum in the specialty **05.31.01 Medical case**,

ЛД-21-02-21 ИН

ЛД-21-02-22 ИН

ЛД-21-03-23 ИН

approved by the academic council of FSBEI HE NOSMA of the Ministry of Health of Russian on May 24, 2023 y. Protocol No8

The work program of the discipline **"Digital technology in medicine",** approved at a meeting of the Department of Chemistry and Physics of May 22 2023y. Protocol No9

The work program of the discipline was approved at a meeting of the central coordinating education-methodical council of May 23, 2023y. Protocol No5

The work program of the discipline was approved by the Scientific Council of the FSBEI HE NOSMA of the Ministry of Health of Russian on March 24, 2023 y. Protocol No8

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Contents of the work program

1. the name of the discipline;
2. list of planned results of training in the discipline, correlated with the planned results of the development of the educational program;
3. ndication of the place of the discipline in the structure of the educational program;
4. The amount of discipline in credit units, indicating the number of academic or astronomical hours allocated to the contact work of students with the teacher (by types of training sessions) and to the independent work of students;
5. content of the discipline, structured according to topics (sections) indicating the number of academic or astronomical hours assigned to them and types of training sessions;
6. list of educational and methodological support for independent work of students on discipline
7. An evaluation materials of tools for conducting intermediate certification of trainees in discipline;
8. List of basic and additional educational literature necessary for mastering the discipline;
9. list of resources of the information and telecommunication network "Internet" (hereinafter referred to as the "Internet" network), necessary for mastering the discipline;
10. methodical instructions for students to learn the discipline;
11. List of information technologies used in the implementation of the educational process for discipline, including a list of software and information reference systems (if necessary);
12. A description of the material and technical base necessary for the implementation of the educational process for discipline.
13. Conducting educational activities using e-learning and distance learning technologies.

2 List of planned learning outcomes for the discipline and the results of mastering the educational program

p/p №	Room/ index compete the	Content of the competence (or part of it)	Name of section disciplines	Indicators of competence achievement	Results of development		
					be able to	be able to	own
1	2	3	4	5	6	7	8
1.	**GPC-10**	The ability to understand the principles of work of modern information technologies and use them to solve the problems of professional activity	Fundamentals of the digital economy and digital health	**IA-1 GPC-10** Be able to use modern methods of collecting and processing information.	theoretical foundations of medical informatics	use educational, scientific, popular science literature,	basic technologies for transforming information, graphic, text, tabular editors, Internet search.
2.	**GPC-10**	The ability to understand the principles of modern information technologies and use them to solve the problems of professional activity	Medical Image Recognition Algorithms	**IA-1 GPC-10** Be able to use modern methods of collecting and processing information..	theoretical foundations of medical informatics	use educational, scientific, popular science literature,,	basic technologies for transforming information, graphic, text, tabular editors, Internet search.
3.	**GPC-10**	The ability to understand the principles of modern information technologies and use them to solve the problems of professional activity	Virtual and Augmented Reality in Medicine	**IA-1 GPC-10** Be able to use modern information and communication tools and technologies	theoretical foundations of medical informatics	use educational, scientific, popular science literature	basic technologies for transforming information, graphic, text, tabular editors, Internet search.
4.	**GPC-10**	The ability to understand the principles of modern information technologies and use them to solve the problems of professional activity	Big data and artificial intelligence in healthcare	**IA-1 GPC-10** Be able to use modern information and communication tools and technologies	theoretical foundations of medical informatics	use educational, scientific, popular science literature,	basic technologies for transforming information, graphic, text, tabular editors, Internet search.
5.	**GPC-10**	The ability to understand the principles of work of modern information technologies and use them to solve the problems of professional activity	Strategy for creating a new model of medical institutions based on digitalization	**IA-1 GPC-10** Be able to use modern information and communication tools and technologies	theoretical foundations of medical informatics	use educational, scientific, popular science literature,	basic technologies for transforming information, graphic, text, tabular editors, Internet search.
6.	**GPC-10**	The ability to understand the principles of modern information technologies and use them to solve the problems of professional activity	Biomedical Signal Analysis - Digital Signals and Images	**IA-1 GPC-10** Be able to use modern information and communication tools and technologies .	theoretical foundations of medical informatics	use educational, scientific, popular science literature,	basic technologies for transforming information, graphic, text, tabular editors, Internet search.

7.	**GPC-10**	The ability to understand the principles of modern information technologies and use them to solve the problems of professional activity	Digital images in MATLAB and their application in medical research	**IA-1 GPC-10** Be able to use modern information and communication tools and technologies	Functional transformations of signals. Digital processing operations.	use technical means, install and remove programs, connect the main elements of the PC	skills of working with the MATLAB package
8.	**GPC-10**	The ability to understand the principles of modern information technologies and use them to solve the problems of professional activity	Software for the implementation of information processes in medicine. Basic technologies of discrete orthogonal and wavelet transformations of information.	**IA-1 GPC-10** Be able to use modern information and communication tools and technologies	theoretical foundations of computer science, collection, storage, search, processing, transformation, use of information computer systems in medicine and healthcare; mathematical methods for solving intellectual problems and their application in medicine;	use educational, scientific, popular science literature	skills of working with the MATLAB package
9.	**GPC-10**	The ability to understand the principles of modern information technologies and use them to solve the problems of professional activity	Pre-processing of medical signals and images using digital technologies.	**IA-1 GPC-10** Be able to use modern information and communication tools and technologies	Block diagrams of digital filters. Isolation of noise in signals. Fast algorithms and implementation in Matlab language.	use educational, scientific, popular science literature, the Internet for professional activities,	skills of working with the MATLAB package

The place of discipline in the structure of the educational program The discipline "Digital technology in medicine" refers to required part of the Block 1 of the Federal State Educational Standard of Higher Education in the specialty of Medicine.

3. The scope of the academic discipline and types of academic work

Type of educational work		Total hours /credits units	Semesters
			III
Classroom activities (total)		54	54
Including:			
Lectures (L)		16	16
Practical training (PT)		38	38
Seminars (C)			
Laboratory work (LW)			
Independent work of the student (IWS), including		18	18
Medical history (IH)			
Coursework (CW)			
Abstract (Abs)			
Calculation and graphic work (RGW)			
Preparation for classes (PC)		9	9
Preparing for routine monitoring (PRM)			
Preparation for Interim Control (PIC)		5	5
Other types of independent work		4	4
Type of intermediate appraisal	set-off (S)		
	exam (E)		
TOTAL: Total labor intensity (units)	72	72	72
	2,0	2,0	2,0

4. Content of the discipline

п/п №	№ Semestra	Name of the section disciplines	Types of educational activities, including independent work of students (in hours)					Forms of ongoing monitoring of academic performance (for the week of the semester)
			L	LW	PT	IWS	всего	
1	2	3	4	5	6	7	8	9
1	3	Fundamentals of the digital economy and digital health	2		2	2	6	Discussion, report, answers to control questions, TT
2	3	Medical Image Recognition Algorithms	2		2	2	6	Discussion, report, answers to control questions, TT
3	3	Virtual and Augmented Reality in Medicine	2		2	2	6	Discussion, report, answers to control questions, TT
4	3	Big data and artificial intelligence in healthcare	8		2	10	20	Discussion, report, answers to control questions, TT
5	3	Strategy for creating a new model of medical institutions based on digitalization	2		2	2	6	Discussion, report, answers to control questions, TT,
6	3	Biomedical Signal Analysis - Digital Signals and Images			8		8	Discussion, report, answers to control questions, TT M
7	3	Digital images in MATLAB and their application in medical research			4		4	Answers to security questions, work on a PC, TT
8	3	Software for the implementation of information processes in medicine. Basic technologies of discrete orthogonal and wavelet transformations of information.			8		8	Answers to security questions, work on a PC, TT, M
9	3	Pre-processing of medical signals and images using digital technologies.			8		8	Answers to security questions, work on a PC, TT, M
		ИТОГО:	**16**		**38**	**18**	**72**	

5. List of educational and methodological support for independent work of students in discipline

№/п	№ семестра	Наименование учебно-методической разработки
1.	3	A.V. Babenko "Digital processing of medical images in MATLAB environment"

6. An Evaluation materials of Means for the Intermediate Certification of Students in Discipline

№/п	List of competences	№ semester	Indicator assessments	Evaluation Criteria	Scale of assessment	Name EM
1	**2**	**3**	**4**	**5**	**6**	**7**
1	GPC-10	III	See standard for quality assessment of education , approved by order FSBEE HE NOSMA Ministry of Health of RF 10.07.2018y., №264/o	see the standard for assessing the quality of education , approved by order FSBEE HE NOSMA Ministry of Health of RF 10.07.2018y., №264/o	see the standard for assessing the quality of education , approved by order FSBEE HE NOSMA Ministry of Health of RF 10.07.2018y., №264/o	Tickets to offset; Test tasks.

7. **The list of basic and additional educational literature necessary for mastering the discipline**

п/п №	NAME	Author (S)	Year, place publications	Number of copies	
				in library	at the department
1	**2**	**3**	**4**	**5**	**6**
main literature					
1.	Medical Informatics	Chernov VI and etc	Rostov n / D, Phoenix, 2007.	100	5
2.	Information systems in healthcare	Sabanov VI, Golubev AN, Komina ER	Rostov n / D, Phoenix, 2007.	71	5
3.	Fundamentals of practical computer science in medicine	Chernov VI, Esaulenko VI, Semenov SN	Rostov n / D, Phoenix, 2007.	101	5
4.	Medical Statistics	Zhizhin K.S.	Rostov n / D, Phoenix, 2007..	100	5
additional literature					
5.	Computer science. Practical course for students of medical schools	Arunyants GG, Stolbovsky DN, Kalinkin A.Yu.	Vladikavkaz, Olympus, 2005.	196	5
6.	Information systems and technologies in medicine and public health services	Ed. Arunyants G.G..	Vladikavkaz, Olympus, 2001.	222	5
7.	Fundamentals of work in the INTERNET network	Arunyants GG, Stolbovsky DN, Kalinkin A.Yu.	Vladikavkaz, Olympus, 2001.	207	5
8.	Medical Statistics	Gerasimov A.N.	M., MIA, 2007	7	5

№ п/п	Наименование	Автор (ы)	Год, место издания	Кол-во экземпляров		Наименование ЭБС/ссылка ЭБС
				в библиотеке	на кафедре	
1	2	3	4	5	6	7
Основная литература						
1.	Медицинская информатика	Чернов В.И. и др.	Ростов н/Д, Феникс, 2007.	100	5	
2.	Информационные системы в здравоохранении	Сабанов В.И., Голубев А.Н., Комина Е.Р.	Ростов н/Д, Феникс, 2007.	71	5	
3.	Основы практической информатики в медицине	Чернов В.И., Есауленко В.И., Семенов С.Н.	Ростов н/Д, Феникс, 2007.	101	5	
4.	Медицинская статистика	Жижин К.С.	Ростов н/Д, Феникс, 2007.	100	5	
5,	Медицинская информатика Учебник	В.П. Омельченко., АЮАЮ Демидова	М:ГЭОТАР-Медиа, 2016			«Консультант студента» http://www.studmedlib.ru/ru/book/ISBN9785970436455.html
Дополнительная литература						
1.	Информатика. Практический курс для студентов медицинских вузов	Арунянц Г.Г., Столбовский Д.Н., Калинкин А.Ю.	Владикавказ, Олимп, 2005.	196	5	
2.	Информационные системы и технологии в медицине и здравоохранении	под ред. Арунянца Г.Г.	Владикавказ, Олимп, 2001.	222	5	
3.	Основы работы в сети INTERNET	Арунянц Г.Г., Столбовский Д.Н., Калинкин А.Ю.	Владикавказ, Олимп, 2001.	207	5	
4.	Медицинская статистика	Герасимов А.Н	М..МИА 2007	7	5	
5.	Медицинская информатика Учебник	Ред Т.В. Зарубиной Б.А. Кобринского	М:ГЭОТАР Медиа, 2016			«Консультант студента» http://studmedlib.ru/ru/book/ISBN9785970436899.html

СОГЛАСОВАНО
Зав. библиотекой

The list of resources of the information and telecommunication network "Internet", necessary for mastering the discipline

1. "Student consultant"
2. **www.galark.ru/arhiv/index.html**
3. The library of the site "Anesthesiology and Implantology in Dentistry" contains a selection of articles for patients and doctors. This section also contains some programs for doctors.
4. **www.disser.ru/library.htm**
   Section "Library" of the site "Doctor-graduate student", contains archived texts of articles from the scientific-practical journal "Doctor-graduate student", articles on philosophy, on the use of statistics and computing, on general issues, useful for graduate students.
5. **www.vsma.ac.ru/~lib/medlib/index.htm**
   The electronic medical library of the Praktika Publishing House offers the texts of all the books in the Foreign Practical Guidelines for Medicine series prepared in 1997-2000. It allows you to view materials on some medical specialties in its own interface (therapy, cardiology, neurology, psychiatry, obstetrics, endocrinology, immunology, pharmacology). Has a query language for complex searches.
6. **revolution.allbest.ru/medicine/**
   Section "Medicine" of the Allbest.ru project - collection of medical abstracts.
7. **www.medsite.net.ru/**
   Medsite project - collection of case histories in many specialties.
8. **makvlad.narod.ru/emergency/history.html**
   Case histories on the project "Site Makvlad`a".
9. **www.medstatistica.com/articles.html**
   Statistics in biomedical research ". Articles and books on the use of statistics in medical and biological research. There is a paid section of dissertation materials.
10. **medlib.tomsk.ru/node/3**
    Scientific Medical Library of Siberian State Medical University.
11. **www.pgpb.ru/libraries/lib_vgmu/library.htm**
    cientific Library of Vladivostok State Medical University.
12. **www.vsma.ac.ru/~lib /**
    United Scientific Medical Library of the Voronezh State Medical Academy named after N. N. Burdenko.
13. **www.igma.ru/content/view/270/260/**
    Library of the Izhevsk State Medical Academy.
14. **www.kgmu.kcn.ru/page.php?parm=division/library/resurs.html**
    Library of Kazan State Medical University.
15. **www.gma.nnov.ru/NGMA/Lib/dates.php**
    Library of the Nizhny Novgorod State Medical Academy.
16. **omsk-osma.ru/rest_14.html**
    Library of the Omsk State Medical Academy.
17. **library.sgmu.ru**
18. Scientific Library of the Saratov State Medical University.
19. **www.yma.ac.ru/bibl.htm#4**
    Library of the Yaroslavl State Medical Academy.
20. **www.lib-med.ru/**
    Lib-Med is a library of instructions for medicines on the unofficial website of the Department of General Dentistry and Anesthesiology, FPDO MGMSU.

LIBRARIES OF HIGHER MEDICAL EDUCATIONAL INSTITUTIONS

1. medlib.tomsk.ru/node/3

Scientific Medical Library of the Siberian State Medical University.

2. www.pgpb.ru/libraries/lib_vgmu/library.htm

Scientific Library of Vladivostok State Medical University.

3. www.vsma.ac.ru/~lib /

Joint Scientific Medical Library of Voronezh State Medical Academy named after. N. N. Burdenko

4. www.igma.ru/content/view/270/260/

Library of the Izhevsk State Medical Academy.

5. www.kgmu.kcn.ru/page.php?parm=division/library/resurs.html

Library of Kazan State Medical University

6. www.gma.nnov.ru/NGMA/Lib/dates.php

Library of the Nizhny Novgorod State Medical Academy

7. omsk-osma.ru/rest_14.html

Library of the Omsk State Medical Academy.

8. library.sgmu.ru/cgi-bin/irbis64r_71/cgiirbis_64.exe?C21COM=F&I21DBN=IBIS&P21DBN=IBIS

Scientific Library of the Saratov State Medical University.

9. www.yma.ac.ru/bibl.htm#4

Library of the Yaroslavl State Medical Academy.

HANDBOOK AND CATALOG OF MEDICINAL DRUGS

1. www.vidal.ru/po_piskreparatov/

Reference book of medicinal preparations VIDAL. Provides a search for drugs on the clinical and pharmacological index, nosological index, anatomically-therapeutically-chemical (ATC) classification system. It contains descriptions of the drugs themselves and their interactions, information for physicians of various specialties on the use of medicines, algorithms for diagnosis and management of patients, recommendations and results of clinical trials.

2. www.rlsnet.ru/tematicheskie_statji.html

Library of the site "Encyclopedia of medicines - radar station". It contains an encyclopedia of medicines, which includes sections: the reference book of medicines, active substances, dosage forms, the directory of illnesses, pharmacological groups, ATX-classification, pharmacological action, manufacturers of medicines. There are books, normative acts and thematic articles on the problems of pharmacotherapy.

3. medi.ru/

4. The MEDI.RU project contains instructions and articles on the use of drugs, has thematic sections on various medical specialties, a preferential list of medicines (DLO).

5. www.lib-med.ru/

Lib-Med — library of instructions for medicines on the unofficial site of the Department of General Practitioners and Anesthesiology of the Moscow State Medical University.

6. www.library2.ru/

The project Library2.ru contains a collection of instructions for medicines and preventive remedies, a dictionary of medical terms

10. Methodical instructions for students to learn the discipline

Training consists of contact work (78 hours) and independent work (30hours). In the discipline, the following educational technologies are used.

Lecture course: lectures accompanied by video materials (slide presentations, demo versions of information medical systems).

Practical exercises: designed for individual work of students with a computer, provide for the solution of situational problems using standard software applications and fragments of special software tools - operating medical information systems (computer simulations of the medical-diagnostic process).

The proportion of sessions conducted in interactive forms is at least 46% of classroom activities.

Independent work with literature and the writing of abstracts form the ability to analyze medical and social problems, the ability to use natural-scientific, medical-biological and clinical information in practice in various types of professional and social activities.

Each student is provided with access to the library funds of the academy and the department.

For each section of the academic discipline, methodical recommendations for students and guidelines for teachers.

Students' learning activities, including independent work with literature and specialized software products, contribute to the mastery of the culture of thinking, the ability in written and oral speech to logically correctly formalize its results; the formation of a systematic approach to the analysis of medical information, the perception of innovation.

11. List of information technologies used in the implementation of the educational process in discipline

PowerPoint
Microsoft Office
Internet Explorer
TTESTER
1C:Медицина. Поликлиника
MindMap

12. Description of the material and technical base necessary for the implementation of the educational process in discipline

Lecture auditoriums with a projector and two equipped computer classrooms for students to carry out the research and development work provided for in the workshop and equipped with a local network and access to the Internet; means for implementing multimedia demonstrations (multimedia projector, laptop, screen, projector, speakers)

Lecture auditoriums with a projector and two equipped computer classrooms for students to carry out the research and development work provided for in the workshop and equipped with a local network and access to the Internet; means for implementing multimedia demonstrations (multimedia projector, laptop, screen, projector, speakers)

13. Conducting educational activities using e-learning and distance learning technologies.

In the context of the introduction of restrictive measures (quarantine) associated with an unfavorable epidemiological situation, the threat of the spread of a new coronavirus infection and other force majeure events that do not allow full-time training, it is possible to study this discipline or part of it using e-learning and distance educational technologies.

Teaching the discipline in the above situations will be carried out through the development of an electronic course with access to video lectures and interactive course materials: presentations, articles, additional materials, tests and various tasks. When conducting training sessions, monitoring progress, as well as intermediate certification of students, platforms of the electronic information and educational environment of the academy and / or other e-learning systems recommended for use in the academy, such as Moodle, Zoom, Webinar, etc., can be used.

Lectures can be presented in the form of audio, video, "live lectures", etc. Conducting seminars and practical classes is possible on-line in both synchronous and asynchronous modes. Seminars can be conducted in the form of web conferences.