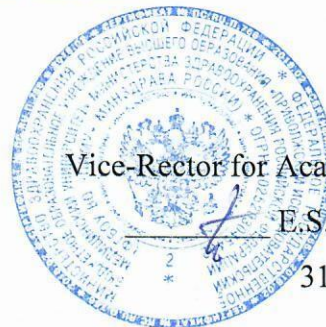


Federal State Budgetary Educational Institution of Higher Education  
"Privolzhsky Research Medical University"  
Ministry of Health of the Russian Federation



APPROVED

Vice-Rector for Academic Affairs

E.S. Bogomolova

31 August 2021

**WORKING PROGRAM**

Name of the academic discipline: **MEDICAL INFORMATICS**

Specialty **31.05.03 DENTISTRY**

Qualification: **DENTIST**

Department: **INFORMATION TECHNOLOGY**

Mode of study: **FULL-TIME**

Labor intensity of the academic discipline: 108 **academic hours**

Nizhny Novgorod  
2021


The working program has been developed in accordance with the Federal State Educational Standard for the specialty **31.05.03 dentistry**, approved by order of the Ministry of Health and Social Development of the Russian Federation No. 96 dated of February 9, 2016.

**Developers of the working program:**

Borisov Igor Borisovich Associate Professor of the Information Technology Department FSBEI HE PRMU MOH Russia, Candidate of Biological Sciences


The program was reviewed and approved at the department meeting (protocol No. 01 June 2021)

Head of the Department,

Candidate of Biological Sciences, Associate Professor  Bavrina Anna Petrovna  
(signature)

01 June 2021

AGREED

Deputy Head of EMA ph.d. of biology  Lovtsova L.V.  
(signature)

01 June 2021

## **1. The purpose and objectives of mastering the academic discipline *medical informatics* (hereinafter – the discipline):**

1.1. The purpose of mastering the discipline: is to form systemic fundamental knowledge about the use of modern information technologies in medicine and the field of healthcare organization for the collection, storage, processing and analysis of biomedical information, which is necessary to improve the quality of medical care to the population in the professional practice of a dentist doctor. (*participation in forming the relevant competencies*).

1.2. Tasks of the discipline:

- to form students' knowledge about the basic approaches of health informatization;
- to study mathematical methods, software and technical means of information technologies used at various stages of obtaining and analyzing biomedical information;
- to familiarize students with modern computer technologies for processing and analyzing medical data used in medicine and healthcare;
- to teach how to use Internet resources to search for medical and biological information.

1.3. Requirements to the deliverables of mastering the discipline

As a result of completing the discipline, the student should

**Know:** the capabilities of reference information systems and professional databases; methods of information retrieval, information and communication technologies; modern medical and biological terminology; fundamentals of information security in professional activities

**Be able to:** apply modern information and communication technologies to solve the tasks of professional activity; carry out an effective search for information necessary to solve the tasks of professional activity using reference systems and professional databases; use modern medical and biological terminology; master and apply modern information and communication technologies in professional activity, taking into account the basic requirements of information security

**Possess:** the practical experience in the use of modern information and bibliographic resources, the use of special software and automated information systems to solve standard tasks of professional activity, taking into account the basic requirements of information security

## **2. Position of the academic discipline in the structure of the General Educational Program of Higher Education (GEP HE) of the organization.**

2.1. The discipline medical informatics refers to the core part of Block 1 of GEP HE (Academic discipline index).

The discipline is taught in first and second semesters of 1 year of study.

**2.2. The following knowledge, skills and abilities formed by previous academic disciplines are required for mastering the discipline:**

- 1.Mathematics;
- 2.Physics.

**2.3. Mastering the discipline is required for forming the following knowledge, skills and abilities for subsequent academic disciplines:**

- 1.Biology;
- 2.Biochemistry;
- 3.Normal physiology;
4. Microbiology, virology;
5. Immunology;
6. Pharmacology;
7. Pathophysiology, clinical pathophysiology;
8. Evidence-based medicine;
9. Organizational aspects of a district doctor activities.

### 3. Deliverables of mastering the academic discipline and metrics of competence acquisition.

Mastering the discipline aims at acquiring the following general professional (GPC) and professional (PC) competencies

№	Competence code	The content of the competence (or its part)	Code and name of the competence acquisition metric (CAM)	As a result of mastering the discipline, the students should:		
				know	be able to	possess
1	GPC-10.	Able to understand the principles of modern information technologies and use them to solve the tasks of professional activity	<p>CAM-10.1<sup>GPC-10</sup>. Capable of reference information systems and professional databases; methods of information retrieval, information and communication technologies; modern medical and biological terminology; fundamentals of information security in professional activities</p> <p>CAM-10.2<sup>GPC-10</sup>. Can apply modern information and communication technologies to solve the tasks of professional activity; carry out an effective search for information necessary to solve the tasks of professional activity using reference systems and professional databases; use modern medical and biological terminology; master and apply modern information and communication technologies in professional activity, taking into account the basic requirements of information security</p> <p>CAM-10.3<sup>GPC-10</sup>. Has practical experience in the use of modern information and bibliographic resources, the use of special software and automated information systems to solve standard tasks of professional activity, taking into account the basic</p>	the capabilities of reference information systems and professional databases; methods of information retrieval, information and communication technologies; modern medical and biological terminology; fundamentals of information security in professional activities	apply modern information and communication technologies to solve the tasks of professional activity; carry out an effective search for information necessary to solve the tasks of professional activity using reference systems and professional databases; use modern medical and biological terminology; master and apply modern information and communication technologies in professional activity, taking into account the basic requirements of	the practical experience in the use of modern information and bibliographic resources, the use of special software and automated information systems to solve standard tasks of professional activity, taking into account the basic requirements of information security

			requirements of information security		information security	
2	PC-21	Able to: analyze morbidity, disability and mortality indicators to characterize the health of the assigned population of medical care and aimed at creating conditions for protecting the health of citizens	<p>CAM-21.1 PC-21. Knows: medical and statistical indicators of morbidity, disability and mortality characterizing health of the assigned population, the order of their calculation and evaluation</p> <p>CAM-21.2 PC-21. Able to: analyze official statistical reporting data, including forms of federal and sectoral statistical observation; analyze medical and statistical indicators of morbidity, disability and mortality to assess the health of the assigned population</p>	medical and statistical indicators of morbidity, disability and mortality characterizing health of the assigned population, the order of their calculation and evaluation	analyze official statistical reporting data, including forms of federal and sectoral statistical observation; analyze medical and statistical indicators of morbidity, disability and mortality to assess the health of the assigned population	
3	PC-22	Able to: maintain medical records, also in the electronic form in the MIS	<p>CAM-22.1 PC-22. Knows: the legislation of the Russian Federation in the field of health protection, regulatory legal acts and other documents defining the activities of medical organizations and medical workers; rules for working in information systems and information and telecommunications network "the Internet"; rules for registration of medical documentation in medical organizations providing outpatient medical care including medical worker's home visits</p> <p>CAM-22.2 PC-22. Able to: fill out medical documentation including in the electronic form in MIS; work with personal data of patients and information constituting a medical secret; use</p>	the legislation of the Russian Federation in the field of health protection, regulatory legal acts and other documents defining the activities of medical organizations and medical workers; rules for working in information systems and information and telecommunications network "the Internet"; rules for registration of medical documentation	Able to: fill out medical documentation including in the electronic form in MIS; work with personal data of patients and information constituting a medical secret; use information systems and information and telecommunication network, the Internet, in professional activities	

			information systems and information and telecommunication network, the Internet, in professional activities	in medical organizations providing outpatient medical care including medical worker's home visits		
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#### 4. Sections of the academic discipline and competencies that are formed when mastering them.

№	Competence code	Section name of the discipline	The content of the section in teaching units
1	GPC-10; PC-21; PC-22	Medical informatics	1. Statistical algorithms for processing of empirical data. 2. Principles of creating computer models. 3. Probabilistic methods in medicine. 4. Basic concepts of computer communication networks. Concepts of local, corporate, regional and global networks. Internet information resources. 5. Basic concepts about the structure and organization of databases (DB) and database management system (DBMS) on the example of MS Access relational DBMS. 6. Principles of presentations making.

#### 5. Volume of the academic discipline and types of academic work

Type of educational work	Labor intensity		Labor intensity (AH) in semesters			
	volume in credit units (CU)	volume in academic hours (AH)	1	2	3	4
Classroom work, including						
Lectures (L)	0,39	14	7	7		
Laboratory practicum (LP)*	1,44	52	26	26		
Practicals (P)						
Seminars (S)						
Student's individual work (SIW)	1,17	42	21	21		
Mid-term assessment						
credit/exam ( <i>specify the type</i> )						
<b>TOTAL LABOR INTENSITY</b>	<b>3</b>	<b>108</b>	<b>54</b>	<b>54</b>		

#### 6. Content of the academic discipline

##### 6.1. Sections of the discipline and types of academic work

№	Name of the section of the academic discipline	Types of academic work* (in AH)					
		L	LP	P	S	SIW	total
1	Informatics	4	12			16	32
2	Medical Information Systems (MIS)	10	40			26	76
	<b>TOTAL</b>	<b>14</b>	<b>52</b>			<b>42</b>	<b>108</b>

\* - L – lectures; LP – laboratory practicum; P – practicals; S – seminars; SIW – student's individual work.

##### 6.2. Thematic schedule of educational work types:

###### 6.2.1 Thematic schedule of lectures

№	Name of lecture topics	Volume in AH	
		semester 1	semester 2
1	Computer architecture.	2	
2	Software.	2	
3	Informatics, medical informatics.	2	
4	Local Area Network.		2
5	Wide Area Network.		2
6	Malicious Software.		2
7	Information security of a medical institution.		2
	TOTAL (total - AH)		14

#### 6.2.2. The thematic plan of laboratory practicums.

№	Name of laboratory practicums	Volume in AH	
		semester 1	semester 2
1	Introduction to Open Office Org. Calc.	3	
2	Correlation and regression in business and in medical activity.	3	
3	Estimating Null hypothesis. Student t-test.	3	
4	Statistical distributions. Normal distribution. Binomial distribution. Poisson distribution.	3	
5	Control work. Estimating of smoking status.	3	
6	Mathematical modeling of physiological processes in medicine. Pharmacokinetic models. Single-chamber models.	3	
7	Pharmacokinetic models. Two-chamber models.	3	
8	Probabilistic methods of differential diagnosis. Bayes' formula.	3	
9	Operative characteristics of diagnostic signs and symptoms Part 1.		3
10	Operative characteristics of diagnostic signs and symptoms Part 2.		3
11	Estimating of heart rate variability (HRV).		3
12	Blood pressure monitoring (BPM).		3
13	Database 1. Creating database tables and forms.		3
14	Database 2. Creating databasequeries and reports.		3
15	Principle of creation of a presentation.		3
16	Revision of the presentation.		3
17	Student reports on presentations.		3
	Credit		1
	TOTAL (total - AH)		52

#### 6.2.3. Thematic plan of practicals

№	Name of the topics of practicals	Volume in AH	
		semester	semester
	Not provided.		
	TOTAL (total - AH)		

#### 6.2.4. Thematic plan of seminars

№	Name of seminar topics	Volume in AH	
		semester	semester
	Not provided.		
	TOTAL (total - AH)		

#### 6.2.5. Types and topics of student's individual work (SIW)

№	Name of laboratory practicums	Volume in AH
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		semester 1	semester 2
1	Introduction to Open Office Org. Calc.	2	
2	Correlation and regression in business and in medical activity.	3	
3	Estimating Null hypothesis. Student t-test.	3	
4	Statistical distributions. Normal distribution. Binomial distribution. Poisson distribution.	3	
5	Control work. Estimating of smoking status.	0	
6	Mathematical modeling of physiological processes in medicine. Pharmacokinetic models. Single-chamber models.	3	
7	Pharmacokinetic models. Two-chamber models.	3	
8	Probabilistic methods of differential diagnosis. Bayes' formula.	2	
9	Operative characteristics of diagnostic signs and symptoms Part 1.		2
10	Operative characteristics of diagnostic signs and symptoms Part 2.		2
11	Estimating of heart rate variability (HRV).		2
12	Blood pressure monitoring (BPM).		2
13	Database 1. Creating database tables and forms.		3
14	Database 2. Creating database queries and reports.		2
15	Principle of creation of a presentation.		5
16	Revision of the presentation.		5
	TOTAL (total - AH)		42

### 7. Types of assessment formats for ongoing monitoring and mid-term assessment

№	Se me ster No	Types of control		Name of section of academic discipline	Compet ence codes	Assessment formats		
						types	number of test questions	number of test task options
1.	1	Current monitor ing	Control of mastering the topic	Introduction to Open Office Org. Calc.		Performing a practical task. Control questions on topic		
2	1	Current monitor ing	Control of mastering the topic	Correlation and regression in business and in medical activity.		Performing a practical task. Control questions on topic		
3	1	Current monitor ing	Control of mastering the topic	Estimating Null hypothesis. Student t-test.		Performing a practical task. Control questions on topic		



4	1	Current monitoring	Control of mastering the topic	Statistical distributions. Normal distribution. Binomial distribution. Poisson distribution.		Performing a practical task. Control questions on topic		
5	1	Current monitoring	Control of mastering the topic	Control work. Estimating of smoking status.		Performing a practical task. Control questions on topic		
6	1	Current monitoring	Control of mastering the topic	Mathematical modeling of physiological processes in medicine. Pharmacokinetic models. Single-chamber models.		Performing a practical task. Control questions on topic		
7	1	Current monitoring	Control of mastering the topic	Pharmacokinetic models. Two-chamber models.		Performing a practical task. Control questions on topic		
8	1	Current monitoring	Control of mastering the topic	Probabilistic methods of differential diagnosis. Bayes' formula.		Performing a practical task. Control questions on topic		
9	2	Current monitoring	Control of mastering the topic	Operative characteristics of diagnostic signs and symptoms Part 1.		Performing a practical task. Control questions on topic		
10	2	Current monitoring	Control of mastering the topic	Operative characteristics of diagnostic signs and symptoms Part 2.		Performing a practical task. Control questions on topic		
11	2	Current monitoring	Control of mastering the topic	Estimating of heart rate variability (HRV).		Performing a practical task. Control		

						questions on topic		
12	2	Current monitoring	Control of mastering the topic	Blood pressure monitoring (BPM).		Performing a practical task. Control questions on topic		
13	2	Current monitoring	Control of mastering the topic	Database 1. Creating database tables and forms.		Performing a practical task. Control questions on topic		
14	2	Current monitoring	Control of mastering the topic	Database 2. Creating database queries and reports.		Performing a practical task. Control questions on topic		
15	2	Current monitoring	Control of mastering the topic	Principle of creation of a presentation.		Performing a practical task. Control questions on topic		
16	2	Current monitoring	Control of mastering the topic	Revision of the presentation.		Performing a practical task. Control questions on topic		
17	2	Mid-term assessment	Credit					

## 8. Educational, methodological and informational support for mastering the academic discipline (printed, electronic publications, the Internet and other network resources)

### 8.1. Key literature references

№	Name according to bibliographic requirements	Number of copies	
		at the department	in the library
1	Omelchenko, V. P. <b>Medical Informatics</b> : textbook : учебник / V. P. Omelchenko, A. A. Demidova ; Omelchenko V. P. ; Demidova A. A. – Москва : ГЭОТАР-Медиа, 2021. – 480 с. – ISBN 978-5-9704-6389-5. – Текст : электронный. – URL: <a href="https://www.studmedlib.ru/book/ISBN9785970463895.html">https://www.studmedlib.ru/book/ISBN9785970463895.html</a> – Режим доступа: по подписке.	1	
2	Omelchenko, V. P.		

	<b>Medical Informatics</b> : учебник / V. P. Omelchenko, A. A. Demidova ; Omelchenko V. P. ; Demidova A. A. – Москва : ГЭОТАР-Медиа, 2020. – 480 с. – ISBN 978-5-9704-5585-2. – Текст : электронный. – URL: <a href="https://www.studentlibrary.ru/book/ISBN9785970455852.html">https://www.studentlibrary.ru/book/ISBN9785970455852.html</a> – Режим доступа: по подписке.	
3	Compiled, B. S. <b>Medical informatics</b> for medical school students in EnglishL: lecture course / b. S. compiled, N. M. Popova ; Compiled B. S., Popova N. M. – Ижевск : ИГМА, 2020. – 56 с. – Текст : электронный. – URL: <a href="https://e.lanbook.com/book/245366">https://e.lanbook.com/book/245366</a> – Режим доступа: по подписке.	
4	<b>Medical informatics</b> : manual for students of higher education institutions studying in the specialty 1-79 01 01 "General Medicine" / С. И. Клинецвич, Е. П. Наумюк, В. М. Завадская [et al.] ; С. И. Клинецвич, Е. П. Наумюк, В. М. Завадская, Т. Н. Сакович, А. В. Копыцкий. – Гродно : ГрГМУ, 2020. – 108 с. – ISBN 9789855952979. – Текст : электронный. – URL: <a href="https://www.books-up.ru/ru/read/medical-informatics-13570186/">https://www.books-up.ru/ru/read/medical-informatics-13570186/</a> – Режим доступа: по подписке.	

## 8.2. Further reading

№	Name according to bibliographic requirements	Number of copies	
		at the department	in the library
1	Bland, M. <b>An introduction to medical statistics</b> / M. Bland ; Bland, Martin. – 3rd ed. – New York : Oxford University Press, 2005. – XVI, 405 p. – ISBN 9780192632692.	1	
2	Bland, M. <b>An Introduction to Medical Statistics</b> / M. Bland ; Bland, Martin. – 3rd ed. – New York ; London : Oxford University Press, 2000. – 405 p. : мяг. – ISBN 0-19-263269-8.	118	
3	<b>Clinical Research Informatics</b> / edited by L. R. Rachel, J. E. Andrews. – Springer, 2012. – 419 p. – ISBN 978-1-84882-447-8.	80	
4	Coiera, E. <b>Guide to health informatics</b> / E. Coiera ; Coiera Enrico. – 2nd. – Arnold, 2003. – ISBN 978-0-340-76425-1.	4	

## 8.3. Electronic educational resources for teaching academic subjects

### 8.3.1. Internal Electronic Library System of the University (IELSU)

№	Name of the electronic resource	Brief description (content)	Access conditions	Number of users
	Internal Electronic Library System of the University (IELSU) <a href="http://81.18.133.188/login.php">http://81.18.133.188/login.php</a>	Full-text database of educational and scientific publications. Main content: the works of PRMU employees	From any computer and mobile device located on the Internet, by password and login	not limited

### 8.3.2. Electronic educational resources acquired by the University

№	Name of the electronic resource	Brief description (content)	Access conditions	Number of users
1	Database «Медицина. Здравоохранение (ВПО)» (ЭБС «Консультант студента») <a href="http://www.studmedlib.ru/">http://www.studmedlib.ru/</a>	Educational literature and additional materials (audio, video, interactive materials, test tasks) for higher medical and pharmaceutical education	From any computer and mobile device located on the Internet, by password and login	not limited
2	Database «Консультант врача. Электронная медицинская библиотека» <a href="http://www.rosmedlib.ru/">http://www.rosmedlib.ru/</a>	Scientific medical publications (national guidelines, clinical recommendations, monographs, etc.)	From any computer and mobile device located on the Internet, by password and login	not limited
3	Electronic Library System «BookUp» <a href="https://www.books-up.ru/">https://www.books-up.ru/</a>	Scientific and educational medical literature of Russian publishers, including translations of foreign publications	From any computer and mobile device located on the Internet, by password and login	not limited
4	Integrated Information and Library System (ELS) of the scientific and educational medical cluster ПФО «Средневолжский» <a href="https://pimunn.ru/lib#rec64131355">https://pimunn.ru/lib#rec64131355</a>	Electronic copies of publications from the collections of libraries participating in the cluster (medical universities of Kazan, Perm, Izhevsk, Kirov; Ulyanovsk State University).	From any computer and mobile device located on the Internet, by password and login	not limited
5	Electronic periodicals 1. on the base of eLIBRARY.RU: <a href="https://elibrary.ru/projects/subscription/rus_titles_open.asp">https://elibrary.ru/projects/subscription/rus_titles_open.asp</a> 2. on the base of East View: <a href="https://dlib.eastview.com/browse">https://dlib.eastview.com/browse</a>	Russian electronic periodicals on medicine and biology	From any computer and mobile device located on the Internet, by password and login	not limited

### 8.3.3 Open access resources

№	Name of the electronic resource	Brief description (content)	Access conditions
1	Federal Electronic Medical Library <a href="http://feml.scsml.rssi.ru/feml">http://feml.scsml.rssi.ru/feml</a>	Full-text electronic copies of printed publications, and independent original electronic publications on medicine and biology	From any computer and mobile device located on the Internet
2	Scientific Electronic Library eLIBRARY.RU <a href="https://elibrary.ru/default.asp">https://elibrary.ru/default.asp</a>	The Russian information portal in the field of science, technology, medicine and education, containing	From any computer and mobile device located on the Internet

	<a href="#">ltx.asp</a>	abstracts and full texts of scientific publications, including electronic versions of Russian scientific journals.	
3	Open Access Scientific Electronic Library “КиберЛенинка” <a href="https://cyberleninka.ru/about">https://cyberleninka.ru/about</a>	Full texts of scientific articles with annotations published in scientific journals of Russia and neighboring countries	From any computer and mobile device located on the Internet
4	National Electronic Library <a href="https://нэб.рф/">https://нэб.рф/</a>	Full-text electronic copies of works on a wide range of knowledge.	From any computer and mobile device located on the Internet. Works restricted by copyright are available only from the computers of the scientific library.

### 9. Material and technical support for mastering an academic discipline

The material and technical base (rooms), which ensures the implementation of the Program on the basis of the University, complies with the current sanitary and technical standards, as well as fire safety standards and rules.

9.1. List of premises for classroom activities for the discipline:

Classrooms for practical classes equipped with computers and multimedia projector.

9.2. List of equipment for classroom activities for the discipline:

Lecture hall equipped with multimedia equipment and microphone.

#### 9.3. A set of licensed and freely distributed software, including domestic production

Item no.	Software	number of licenses	Type of software	Manufacturer	Number in the unified register of Russian software	Contract No. and date
1	Wtware	100	Thin Client Operating System	Kovalev Andrey Alexandrovich	1960	2471/05-18 from 28.05.2018
2	MyOffice is Standard. A corporate user license for educational organizations, with no expiration date, with the right to receive updates for 1 year.	220	Office Application	LLC "NEW CLOUD TECHNOLOGIES"	283	without limitation, with the right to receive updates for 1 year.
3	LibreOffice		Office Application	The Document Foundation	Freely distributed software	
4	Windows 10 Education	700	Operating systems	Microsoft	Azure Dev Tools for Teaching Subscriptio	

					n	
5	Yandex. Browser		Browser	«Yandex»	3722	
6	Subscription to MS Office Pro for 170 PCs for FGBOU VO "PIMU" of the Ministry of Health of Russia	170	Office Application	Microsoft		23618/HN100 30 LLC "Softline Trade" from 04.12.2020

**10. List of changes to the working program (to be filled out by the template)**

Federal State Budgetary Educational Institution of Higher Education  
"Privolzhsky Research Medical University"  
Ministry of Health of the Russian Federation  
(FSBEI HE "PRMU" of the Ministry of Health of Russia)

Department of  
**Information technology**

**CHANGE REGISTRATION SHEET**

working program for the academic discipline

**Medical informatics**

Field of study / specialty / scientific specialty: **31.05.03 Dentistry**  
(code, name)

Training profile: **Dentist doctor**  
(name) - for master's degree programs

Mode of study: **Full-time**  
full-time/mixed attendance mode/extramural

Position	Number and name of the program section	Contents of the changes made	Effective date of the changes	Contributor's signature
1				
2				

Approved at the department meeting

Protocol No. \_\_\_\_ of \_\_\_\_\_ 20\_\_

Head of the Department of Information technology  
Candidate of Biological Sciences, Associate Professor / \_\_\_\_\_ Bavrina A.P.