
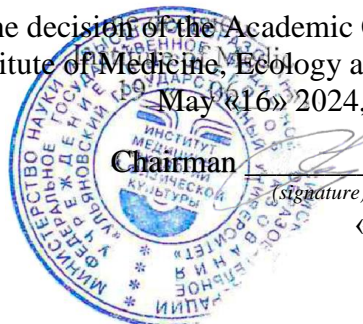


Ministry of Science and High Education of RF Ulyanovsk State University	Form	
F-Educational plan of the discipline		

**APPROVED**  
by the decision of the Academic Council of the USU  
Institute of Medicine, Ecology and Physical Culture  
May «16» 2024, record no. №9/260



Chairman \_\_\_\_\_ /V.V.Mashin/  
(signature)

«16 » of May 2024.

### EDUCATIONAL PLAN

Discipline	<b>Informatics (in medicine)</b>
Faculty	<b>Faculty of High Technology Physics and Engineering</b>
Department	<b>Material Physics</b>
Course	<b>1</b>

Speciality: **31.05.01 «General medicine»**

*(code of the speciality, full name)*

Form of education: **full time education**

Date of introducing in the instruction process at USU: **«01» of September 2024.**



The program was updated at the meeting of the department: № \_\_\_\_\_ of \_\_\_\_\_ 20\_\_\_\_.


The program was updated at the meeting of the department: № \_\_\_\_\_ of \_\_\_\_\_ 20\_\_\_\_.

The program was updated at the meeting of the department: № \_\_\_\_\_ of \_\_\_\_\_ 20\_\_\_\_.

Information about the authors:


Initials	Department	Degree, Scientific rank
Rybin V.V.	Material Physics	PhD, Associate Professor

Agreed	Agreed
Head of the department of Material Physics	Head of the department of Hospital Therapy
 _____ / V.N. Golovanov / <i>Signature</i> « 14 » of May 2024.	 _____ / M.A. Vize-Khripunova / <i>Signature</i> « 14 » of May 2024.

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**LIST OF CHANGES of  
Educational plan of discipline: Informatics (in medicine)  
Specialty 31.05.01. «General medicine»**

<b>№</b>	<b>Content of the change or a link to the attached text of the</b>	<b>Full name of the head of the Department developing the discipline</b>	<b>Signature</b>	<b>Date</b>
<b>1</b>	Introduction of changes to item C) Professional databases, information and reference systems item 11 "Educational, methodological and information support of the discipline" with the design of Appendix 1			16.06.2024
<b>2</b>	Introduction of changes to item A) Recommended Literature item 11 "Educational, methodological and information support of the discipline" with the design of Appendix 2			16.06.2024

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## 1. OBJECTIVES AND AIM OF INFORMATICS (IN MEDICINE)

The aim of the course is mastering the student theoretical fundamentals of medical informatics and practice of application of modern information and telecommunication technologies in medicine and health care.

The process of discipline development «Informatics (in medicine)» is to form general professional competences (UC-3, GPC-10).

### List of Objectives that students have to solve after Informatics (in medicine):

- studying by students of the medical informatics theoretical fundamentals necessary for its application in medicine and health care;
- studying by students of applied and special computer programs for the solution of medicine and health care problems taking into account the latest information and telecommunication technologies;
- formation of informatization methods ideas, automation of clinical trials, informatizations of management in health system;
- studying of medical decisions support information systems;
- development by students of practical abilities on use of medical information systems for diagnostics, prevention, treatment and rehabilitation.

## 2. PLACE OF THE SUBJECT IN THE STRUCTURE OF GEP


In accordance with the Federal State Educational Standard of Higher Education, the discipline "Informatics (in medicine)" refers to the basic part of the specialty disciplines on 31.05.01 "Medicine" (level of specialty) of higher medical education and is studied in the first semester.

Requirements to entrance knowledge, competences and abilities for studying of discipline: possession of theoretical knowledge and practical skills of work with computer systems in volume of a school course of fundamentals of informatics, and also knowledge of disciplines of a mathematical, natural-science cycle.

## 3. LIST OF EXPECTED RESULTS OF INSTRUCTION ON THE SUBJECT (UNIT), CORELATED WITH PLANNED RESULTS OF COMPLETING THE PROGRAM

The study of the subject «Informatics (in medicine)» within the completion of the educational program is directed towards the formation of the following general and professional competences in students:

Code and name of the general professional competence	Code and name of the indicator of achievement of general professional competence
<p><b>UC-3</b> Able to organize and manage the work of a team, developing a team strategy to achieve a set goal</p>	<p><b>AI-1UC3 To know:</b> team building techniques.  <b>AI-2UC3 To be able to:</b> to develop a plan for group and organizational communications in the preparation and implementation of a project.  <b>AI-3UC3 To own to:</b> to analyze, design and organize interpersonal, group and organizational communications in a team to</p>

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	achieve a set goal.
<b>GPC-10</b> Able to understand the principles of work of modern information technologies and use them to solve the problems of professional activity	<p><b>AI-1GPC10 To know:</b> the composition and purpose of the main elements of a personal computer, their characteristics; concepts and classification of software.</p> <p><b>AI-2GPC10 To be able to:</b> to use the Internet for professional activities; to carry out statistical processing of experimental data; calculate the main characteristics and estimates of the distribution of a discrete random variable.</p> <p><b>AI-3GPC10 To own to:</b> own ways to carry out statistical processing of experimental data.</p>

#### 4. VOLUME OF THE SUBJECT

4.1. Volume of the subject in credit points (total): 3 credit points


4.2. On types of academic workload (in hours)

Type of academic work	Number of hours (form of education – full-time)	
	Total according to the plan	Including on semesters № semester 1
1	2	3
Work of students with a teacher	54	54
Classes:		
• lectures	18	18
• practical classes and seminars	Not provided	Not provided
• lab classes (practical lessons)	36	36
Self-study work	54	54
Concurrent control (number and type: a test, a colloquium, a report)	Questioning, testing, demonstration of practical skills	Questioning, testing, demonstration of practical skills
Course paper	Not provided	Not provided
Types of intermediate attestation (examination, test)	credit	credit
Total number of hours on the subject	<b>108</b>	<b>108</b>

4.3. Contents of the discipline (module). Distribution of hours on themes and kinds of study: Number of hours – 108 h


The form of training: full-time

Name of sections and themes	Total	Activity format					Form of current control
		Classroom studies			Interactive classes	Self-study work	
		lect.	pract.cl.	Laboratory work			
1	2	3	4	5	6	7	8
Concept of information. General characteristic of processes of collecting, transfer, processing and accumulation of infor-	17	2		9		6	

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Information systems for medical and health care							
Telecommunication technologies and Internet resources in medicine	11	2		3		6	
Basic technologies of transformation of information	11	2		3		6	
Modeling of physiological, morphological, molecular and genetic and biochemical processes	11	2		3		6	
Information systems of treatment-and-prophylactic establishments	11	2		3		6	
Information support of medical and diagnostic process	12	2		4		6	
Medical and technological systems for monitoring and controlling body functions	12	2		4		6	
Automated medical and technological systems for clinical and laboratory research and functional diagnostics	12	2		4		6	
Information systems in healthcare management at territorial and federal level	11	2		3		6	
<b>Total:</b>	<b>108</b>	<b>18</b>	<b>-</b>	<b>36</b>		<b>54</b>	<b>-</b>

If it is necessary to use partially or exclusively distance learning technologies in the educational process, it should be noted that the total number of hours (c.u.) set by the Department of discipline/specialty for each discipline/practice remains unchanged and is implemented in full. In this case, in the corresponding section of the educational program the total number of hours of work with students in accordance with the educational plan is allocated and the number of hours for conducting classes in a remote format using e-learning (online courses, lectures and seminars in videoconference mode, virtual practical classes, laboratory work in the form of virtual analogues, calculation and graphic works, individual tasks in the electronic information and educational environment, etc.) Training and industrial practice for all areas of discipline/specialties of all forms of training can be partially or fully implemented in a remote format.

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## 5. COURSE CONTENT

### ***Unit 1. Concept of information. General characteristic of processes of collecting, transfer, processing and accumulation of information. Methods and means of informatization in medicine and health care***

Information and information process. Types of information. Informatics as independent science. Subject and problems of medical informatics. Main stages of development of domestic medical informatics. Features of medical information. Classes and types of medical information systems.

### ***Unit 2. Telecommunication technologies and Internet resources in medicine***

Concept of a telemedicine. Standard and legal base of development of a telemedicine in the Russian Federation. Distance learning. Application of telecommunication technologies in clinical practice. Internet resources for search of professional information.

### ***Unit 3. Basic technologies of transformation of information***

Possibilities of standard software for the solution of problems of applied medicine.

### ***Unit 4. Modeling of physiological, morphological, molecular and genetic and biochemical processes***

The principles of creation of mathematical models of the pharmacokinetic, physiological and other processes proceeding in a human body for the subsequent their use as a part of the automated systems of support of adoption of medical decisions. Types of mathematical models.

### ***Unit 5. Information systems of treatment-and-prophylactic establishments***

Methodology of creation of medical information system of LPU. Levels of informatization of LPU. The purposes, tasks, structure, the main functions and principles of development of the automated information systems of LPU. Role of automation of separate services and divisions of LPU.

### ***Unit 6. Information support of medical and diagnostic process***

Information model of medical and diagnostic process. Elements of profession of a physician as object of informatization. Formalization and structurization of medical information. The main requirements to drawing up the formalized medical documents.

Features of decision-making in medicine. Information analysis algorithms - statistical and based on knowledge. Possibilities of expert systems.


### ***Unit 7. Medical and technological systems for monitoring and controlling body functions***

Composition, functions and principles of implementation of monitor-computer systems. Methods for processing electrophysiological signals. Algorithms for supporting medical decision-making and objectifying the assessment of the severity of an intensive care patient.

The models of physiological systems used for an assessment and management of a functional condition of an organism.

Use of specialized information and technological system of office of intensive therapy for the solution of a problem of forecasting of an outcome of a disease and an assessment of a condition of various systems of a homeostasis of the resuscitation patient.

### ***Unit 8. Automated medical and technological systems for clinical and laboratory research and functional diagnostics***

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The organization of technological process in medical laboratory. Relevance of automation of laboratory activity. Structure and functions of laboratory information systems. Systems of genetic diagnostics and analysis. Medical instrument and computer systems for functional researches of physiological systems of an organism. Computer processing and analysis of signals and images. Information support

***Unit 9. Information systems in healthcare management at territorial and federal level***

The purposes, tasks, structure, the main functions and the principles of development of the automated information systems for municipal, territorial, federal levels of health care. Main sources of information. Groups of the analyzed indicators. Ways of representation and data processing. Organizational and legal support of the medical information systems (MIS). Main standards of an exchange of medical information. Abilities to integrate MIS. The basic concepts and definitions in the sphere of information security.

**6. PRACTICAL CLASSES AND SEMINARS**

Not provided.

**7. LABORATORY CLASSES**

Lab 1. Standard software (text editors, spreadsheets, DBMS, systems of computer presentations) for the solution of medical tasks (9 hs.)

Lab 2. Means of the Internet for search of professional information on separate sections of medical knowledge (3 hs.)

Lab 3. Algorithms of modeling of physiological processes for the solution of clinical tasks (6 hs.)

Lab 4. Information management systems treatment-and-prophylactic institution (AIS LPU) (6 hs.)

Lab 5. The Automated Workplace (AW) of the doctor of medical office — the main functions and the principles of work (6 hs.)

Lab 6. The principles of creation of specialized information and technological systems of office of a hospital on the example of the automated information system of the intensive care unit and intensive therapy (6 hs.)

Lab 7. Information medical systems of diagnostic services (offices of functional diagnostics and laboratory researches) (6 hs.)

Lab 8. Automated workplace of the doctor of functional diagnostics and the laboratory doctor - the main functions and the principles of work (6 hs.)


Lab 9. Information systems for management of health care of territorial level (6 hs.)

**8. SUBJECTS OF COURSE PAPERS, TESTS, ESSAYS**

Not provided.

**9. QUESTIONS FOR CREDIT ON DISCIPLINE**

1. Basic concepts of informatics: messages, information, data.
2. Types of information.
3. Subject and tasks medical information scientist.
4. Main stages of development of domestic medical informatics.

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5. Concept of a telemedicine.
6. Concept of mathematical model.
7. Levels of health care informatization.
8. The purposes, tasks, structure, the main functions and the principles of development of the automated information systems of LPU.
9. Concept of information model of medical and diagnostic process.
10. The purposes, tasks, structure, the main functions and the principles of development of the automated information systems of LPU automated information systems.
11. Formalization and structuring of medical information.
12. The basic concepts and definitions in the sphere of information security and information security.
13. Levels of LPU informatization.
14. Information analysis algorithms - statistical and based on knowledge.
15. Information model of medical and diagnostic process

### 10. SELF-STUDY WORK OF STUDENTS

Education form: full-time.

Name of the section / subject	Types of SSW	Total number of hours	Current control
Concept of information. General characteristic of processes of collecting, transfer, processing and accumulation of information. Methods and means of informatization in medicine and health care	Study of literature Mastering practical skills according check lists	6	Questioning, testing, checking practical skills according check lists
Telecommunication technologies and Internet resources in medicine	Study of literature Mastering practical skills according check lists	6	Questioning, testing, checking practical skills according check lists
Basic technologies of transformation of information	Study of literature Mastering practical skills according check lists	6	Questioning, testing, checking practical skills according check lists
Modeling of physiological, morphological, molecular and genetic and biochemical processes	Study of literature Mastering practical skills according check lists	6	Questioning, testing, checking practical skills according check



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			lists
Information systems of treatment-and-prophylactic establishments	Study of literature Mastering practical skills according check lists	6	Questioning, testing, checking practical skills according check lists
Information support of medical and diagnostic process	Study of literature Mastering practical skills according check lists	6	Questioning, testing, checking practical skills according check lists
Medical and technological systems for monitoring and controlling body functions.	Study of literature Mastering practical skills according check lists	6	Questioning, testing, checking practical skills according check lists
Automated medical and technological systems for clinical and laboratory research and functional diagnostics.	Study of literature Mastering practical skills according check lists	6	Questioning, testing, checking practical skills according check lists
Information systems in healthcare management at territorial and federal level.	Study of literature Mastering practical skills according check lists	6	Questioning, testing, checking practical skills according check lists
Total		54	

## 11. EDUCATIONAL-METHODICAL AND INFORMATION SUPPORT OF DISCIPLINE

### a) List of recommended literature

#### Core reading:

1. Долгов В.В. Medical Informatics [Электронный ресурс]: учебное пособие/ Долгов В.В.— Электрон. текстовые данные.— Санкт-Петербург: Санкт-Петербургский медико-социальный институт, 2016.— 52 с.— Режим доступа: <http://www.iprbookshop.ru/74247.html>.
2. Omelchenko, V. P. Medical Informatics : textbook : textbook / V. P. Omelchenko, A. A. Demidova. - Москва : ГЭОТАР-Медиа, 2021. - 480 с. - ISBN 978-5-9704-6389-5. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : <https://www.studentlibrary.ru/book/ISBN9785970463895.html>.

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### Supplementary reading:

1. Тестовые вопросы по медицинской информатике для студентов English Medium : учебно-методическое пособие (на английском языке) / В. Д. Проценко, Е. А. Лукьянова, Т. В. Ляпунова [и др.]. — Москва : Российский университет дружбы народов, 2017. — 72 с. — ISBN 978-5-209-08035-0. — Текст : электронный // Электронно-библиотечная система IPR BOOKS : [сайт]. — URL: <http://www.iprbookshop.ru/91080.html>
2. Клинецвич, С. И. Информатика в медицине : учебно-методическое пособие / С. И. Клинецвич. — Гродно : ГрГМУ, 2020. — 108 с. — ISBN 978-985-595-297-9. — Текст : электронный // Лань : электронно-библиотечная система. — URL: <https://e.lanbook.com/book/237374>

### Educational and methodical literature:

1. Methodical instructions of practical and laboratory work on medical informatics or informatics (in medicine) for the students of 31.05.01 «General medicine» / V. V. Rybin ; Ulyanovsk State University. - 2024. - 92 p. - Неопубликованный ресурс. - URL: <http://lib.ulsu.ru/MegaPro/Download/MObject/16061>. - Режим доступа: ЭБС УлГУ. - Текст : электронный.
2. Methodical instructions of independent work on medical informatics or informatics (in medicine) for the students of 31.05.01 «General medicine» / V. V. Rybin ; Ulyanovsk State University. - 2024. - 10 p. - Неопубликованный ресурс. - URL: <http://lib.ulsu.ru/MegaPro/Download/MObject/16060>. - Режим доступа: ЭБС УлГУ. - Текст : электронный.

Согласовано:

Leading specialist                      Стажерка                      Стажер                      20.05.2024  
 Должность сотрудника научной библиотеки                      ФИО                      подпись                      дата

b) **Software:** OS Microsoft Windows, Microsoft Office, Browser, Online Image processing software.

c) **Professed data base, directory and search systems:**


#### 1. Электронно-библиотечные системы:

1.1. Цифровой образовательный ресурс IPRsmart : электронно-библиотечная система : сайт / ООО Компания «Ай Пи Ар Медиа». - Саратов, [2024]. – URL: <http://www.iprbookshop.ru>. – Режим доступа: для зарегистрир. пользователей. - Текст : электронный.

1.2. Образовательная платформа ЮРАЙТ : образовательный ресурс, электронная библиотека : сайт / ООО Электронное издательство «ЮРАЙТ». – Москва, [2024]. - URL: <https://urait.ru> . – Режим доступа: для зарегистрир. пользователей. - Текст : электронный.

1.3. База данных «Электронная библиотека технического ВУЗа (ЭБС «Консультант студента») : электронно-библиотечная система : сайт / ООО «Политехресурс». – Москва, [2024]. – URL: <https://www.studentlibrary.ru/cgi-bin/mb4x>. – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.4. Консультант врача. Электронная медицинская библиотека : база данных : сайт / ООО «Высшая школа организации и управления здравоохранением-Комплексный медицинский консалтинг». – Москва, [2024]. – URL: <https://www.rosmedlib.ru>. – Режим

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доступа: для зарегистрир. пользователей. – Текст : электронный.

1.5. Большая медицинская библиотека : электронно-библиотечная система : сайт / ООО «Букап». – Томск, [2024]. – URL: <https://www.books-up.ru/ru/library/> . – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.6. ЭБС Лань : электронно-библиотечная система : сайт / ООО ЭБС «Лань». – Санкт-Петербург, [2024]. – URL: <https://e.lanbook.com>. – Режим доступа: для зарегистрир. пользователей. – Текст : электронный.

1.7. ЭБС **Znanium.com** : электронно-библиотечная система : сайт / ООО «Знаниум». - Москва, [2024]. - URL: <http://znanium.com> . – Режим доступа : для зарегистрир. пользователей. - Текст : электронный.

**2. КонсультантПлюс** [Электронный ресурс]: справочная правовая система. / ООО «Консультант Плюс» - Электрон. дан. - Москва : КонсультантПлюс, [2024].

**3. eLIBRARY.RU**: научная электронная библиотека : сайт / ООО «Научная Электронная Библиотека». – Москва, [2024]. – URL: <http://elibrary.ru>. – Режим доступа : для авториз. пользователей. – Текст : электронный

**4. Федеральная государственная информационная система «Национальная электронная библиотека»** : электронная библиотека : сайт / ФГБУ РГБ. – Москва, [2024]. – URL: <https://нэб.рф>. – Режим доступа : для пользователей научной библиотеки. – Текст : электронный.

**5. Российское образование** : федеральный портал / учредитель ФГАУ «ФИЦТО». – URL: <http://www.edu.ru>. – Текст : электронный.

**6. Электронная библиотечная система УлГУ** : модуль «Электронная библиотека» АБИС Мега-ПРО / ООО «Дата Экспресс». – URL: <http://lib.ulsu.ru/MegaPro/Web>. – Режим доступа : для пользователей научной библиотеки. – Текст : электронный.

Инженер ведущий



Щуренко Ю.В.

2024

## 12. MATERIAL AND TECHNICAL SUPPORT OF THE DISCIPLINE


Classrooms for seminars, for the current control and interim certification, group and individual consultations of the Committee are designed with specialized furniture.

Rooms for independent work are equipped with computer equipment with the ability to connect to the Internet and provide access to electronic information and educational environment, electronic library system.

## 13. SPECIAL CONDITIONS FOR STUDENTS WITH DISABILITIES

Training students with disabilities is carried out taking into account the peculiarities of psychophysical development, individual capabilities and health of such students. Education of students with disabilities can be organized in conjunction with other students, and separately. If necessary, students from among persons with disabilities (at the request of the student) may be offered one of the following options for the perception of information, taking into account their individual psychophysical characteristics:

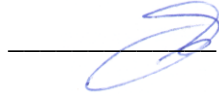
– for persons with visual impairment: in printed form in large print; in the form of an electronic document; in the form of an audio file (translation of educational materials into audio format); in printed form in Braille; individual consultations with the involvement of a tiflosurdo-perevodchika; individual tasks and consultations;

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– for persons with hearing impairment: in printed form; in the form of an electronic document; video materials with subtitles; individual consultations with the assistance of a sign language interpreter; individual tasks and consultations;

– for persons with musculoskeletal disorders: in printed form; in the form of an electronic document; in the form of an audio file; individual tasks and consultations.

Developer  
V.V.Rybin



PhD, Associate Professor Material Physics Department,

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### ЛИСТ ИЗМЕНЕНИЙ

<b>№ п/п</b>	<b>Содержание изменения или ссылка на прилагаемый текст изменения</b>	<b>ФИО заведующего кафедрой, реализующей дисциплину/выпускающей кафедры</b>	<b>Подпись</b>	<b>Дата</b>