Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
NAMED AFTER PATRICE LUMUMBA
RUDN University
Institute of Medicine

educational division (faculty/institute/academy) as higher education programme developer

COURSE SYLLABUS

MEDICAL INFORMATICS

course title

Recommended by the Didactic Council for the Education Field of:

31.05.01 General Medicine

field of studies / speciality code and title

The course instruction is implemented within the professional education programme of higher education:

General Medicine

higher education programme profile/specialisation title

2026

1. COURSE GOAL(s)

The course "Medical Informatics" is part of the specialist program "General Medicine" in the field of study 31.05.01 "General Medicine" and is studied in the 2nd semester of the 1st year. The discipline is delivered by the Department of Medical Informatics and Telemedicine. The discipline consists of 6 sections and 16 topics and is aimed at studying the fundamentals of modern information technologies and the trends in their development.

The purpose of studying the course is to teach students the basics of medical informatics, methods of informatization of medical practice, principles of building information models, analyzing the results obtained, and applying modern information technologies in professional activities

2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the course "Medical Informatics" is aimed at developing the following competencies (or parts thereof) in students:

Table 2.1. List of competences that students acquire through the course study

Competence code	**Competence descriptor**	**Competence formation indicators** (within this course)
UC-1	Able to critically analyze problem situations based on a systematic approach, develop a strategy of action	UC-1.1 Analyzes scientific and technical literature and regulatory documentation of medical organizations; UC-1.2 Critically evaluates the reliability of information sources, works with contradictory information from different sources;
GPC-10	Able to solve standard tasks of professional activity using information and bibliographic resources, biomedical terminology, information and communication technologies, taking into account the basic requirements of information security	GPC -10.1 Able to use modern information and communication tools and technologies in professional activities;
		GPC -10.2 Able to comply with information security rules in professional activities;
		GPC -10.3 Able to use information and communication technologies, including application software, using artificial intelligence technologies, when solving professional tasks

3. THE COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The course refers to the core/variable/elective* component of B block of the higher educational programme curriculum.

* - Underline whatever applicable.

Within the higher education programme students also master other (modules) and / or internships that contribute to the achievement of the expected learning outcomes as results of the course study.

Table 3.1. The list of the higher education programme components/disciplines that contribute to the achievement of the expected learning outcomes as the course study results

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
UC-1	Able to critically analyze problem situations based on a systematic approach, develop a strategy of action	Philosophy; Mathematics; Chemistry; Physics;	Hygiene; Public Health and Healthcare, Health Economics; Epidemiology; Propaedeutics of Internal Diseases; Evidence-based Medicine; History of Medicine; Clinical Pharmacology; Socially Significant Projects in Medicine; Economics**;
GPC-10	Able to solve standard tasks of professional activity using information, bibliographic resources, biomedical terminology, information and communication technologies, taking into account the basic requirements of information security		Anesthesiology, Resuscitation, Intensive Care; Biostatistics; Telemedicine; Methods of Analysis of Biomedical Data. Artificial Intelligence in Implementing Practical Healthcare Tasks; Data Analysis and Visualization; Evidence-based Medicine; Fundamentals of Research Work;

* To be filled in according to the competence matrix of the higher education programme.

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the course "**Medical Informatics**" is **2** credits (72 academic hours).

*Table 4.1. Types of academic activities during the periods of higher education programme mastering (**full-time training**)**

Type of academic activities		Total academic hours	Semesters/training modules	
			10	
Classroom learning *, ac.h.*		**51**	**51**	
Lectures (LC)		0	0	
Lab work (LW)		0	0	
Seminars (workshops/tutorials) (S)		51	51	
Self-studies		**12**	**12**	
Evaluation and assessment (exam/passing/failing grade)		*9*	*9*	
Total workload of the course	ac.h.	**72**	**72**	
	credits	**2**	**2**	

5. COURSE CONTENTS

Table 5.1. Course contents and academic activities types

Course module title	Course module contents (topics)	Academic activities types
Section 1 Introduction to Medical Informatics	1.1 Basic concepts of medical informatics Concept of information, representation of information in a computer.	S
	1.2 Hardware of medical informatics Personal computer structure, main components of an IBM PC (system unit, keyboard, monitor), principle of open architecture. Input devices (keyboard, mouse, scanner, joystick, digitizer). Output devices (monitor, printer, plotter). Memory: RAM, ROM, long-term memory.	S
	1.3 Software tools for implementing information processes Types of software (system programs, utilities, application software, programming systems), archiving programs (Zip, Arj, Rar), antivirus programs.	S
Section 2 Technology of medical data processing using word processors	2.1 Introduction to word processors Microsoft Word, Open Office Writer Program interface, main controls: title bar, menu bar, toolbars, ruler, status bar, scroll bars, document window, pointers (cursor, mouse). Creating, saving and closing documents, working with windows, finding saved documents. Menu structure. Text input. Character formatting (changing font style, type and size), paragraph formatting (setting line spacing, paragraph alignment), tabulation, print preview.	S
	2.2 Complex document formatting, special functions Page setup, headers and footers, entering text in multiple columns. Working with lists (bulleted, numbered, multilevel). Style formatting, templates. Tables of contents and indexes. Creating sections. Inserting special characters, drawings, objects. Editing formulas.	S
	2.3 Working with tables in a word processor Creating a table, cells, rows, columns, headers, borders and shading, autoformatting, inserting rows and columns into a table. Using formulas.	S
Section 3 Technologies for medical data processing using spreadsheet processors	3.1 Introduction to spreadsheet processors Microsoft Excel, Open Office Calc Program interface, main components: menu title, toolbar, formula bar, worksheet tabs, status bar, work area. Work area components: columns and rows, cells, workbooks and worksheets. Cell addressing. Data types used in MS Excel, OOCalc. Data entry and editing. Cell formatting.	S
	3.2 Using mathematical functions in Microsoft Excel, Open Office Calc Sorting and searching data, entering formulas, mathematical operation priorities, cell operations, arithmetic operations with cells. Built-in functions. Using simple mathematical functions: "autosum", "average", "maximum", "IF" function, other functions.	S
	3.3 Visualization of medical data in a spreadsheet processor Creating and editing charts, histograms, graphs. Chart Wizard. Chart parameters.	S
	3.4 Discrete and continuous random variables, numerical characteristics of random variables. Variation series Using statistical functions for medical data processing, constructing variation series.	S

Section 4 Technologies for storing and processing medical data using Database Management Systems	4.1 Introduction to Microsoft Access and Open Office Base databases Working with information: search, sorting, queries. Creating queries. Select query, create table query, update, append, delete queries, query designer. Selection criteria, wildcards, operators and operands. Functions, group operations. Search, sorting, filtering records.	S
	4.2 Working with medical data in a DBMS History of development of modern Medical Information Systems (MIS). Classification and types of MIS.	S
Section 5 Network technologies. Computer networks in medicine	5.1 Network technologies Types of computer networks: local area network, corporate network. Network architecture: router, gateway, service provider, server, modem, dedicated network. Addressing, concept of IP address. Web (World Wide Web or WWW), Web pages. Home pages. Searching for information on the WWW, search engines, browser Mozilla Firefox. Uniform Resource Locator (URL), keywords, types of information resources. Protocols HTTP, FTP, packets, checksum. Hypertext Markup Language. Medical Internet resources.	S
	5.2 Internal electronic resources of RUDN University Client and server mail services. Email service providers. Working with emails, attachments, address book. Security basics when working with email, SPAM. Internal electronic resources of RUDN University: RUDN main website, Medical Institute website, RUDN educational portal.	S
Section 6 Python in medicine	6.1 Basics of programming in Python for calculating medical indicators Language syntax, structured and procedural programming, data structure.	S
	6.2 Artificial intelligence in Python Tools for AI in Python. Main paradigms of AI.	S

only for full-time study: L – lectures; LW – laboratory work; S – practical/seminar classes.

6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENT

Table 6.1. Classroom equipment and technology support requirements

Type of academic activities	**Classroom equipment**	**Specialised educational / laboratory equipment, software, and materials for course study** (if necessary)
Computer lab	Computer lab for classes, group and individual consultations, current monitoring and intermediate assessment, equipped with personal computers (20 pcs.), board (screen) and multimedia presentation equipment.	Specialized furniture; technical equipment: Epson EB-965H multimedia projector, Acer Aspire C24-865 all-in-one PCs, Lenovo V30a-24IML All-In-One 23.8", all-in-one PCs (15 pcs.) Acer Z3-615, with internet access. Software: Microsoft products (OS, office suite including MS Office/Office 365).
Seminar	Classroom for seminar-type classes, group and individual consultations, current monitoring and intermediate assessment, equipped with	

	specialized furniture and multimedia presentation equipment.	
Self-studies	Classroom for independent work of students (can be used for seminars and consultations), equipped with specialized furniture and computers with access to the electronic information and educational environment (EIEE).	Specialized furniture; technical equipment: Epson EB-965H multimedia projector, Acer Aspire C24-865 all-in-one PCs, Lenovo V30a-24IML All-In-One 23.8", all-in-one PCs (15 pcs.) Acer Z3-615, with internet access. Software: Microsoft products (OS, office suite including MS Office/Office 365).

7. RESOURCES RECOMMENDED FOR COURSE STUDY

Main readings:

1. V.L. Stolyar, E.A. Lukyanova, T.V. Lyapunova [et al.]. Learning Computer and Programs: study guide - Moscow: RUDN, 2023. - 260 p.: ill.
2. Medical Informatics: textbook for educational institutions implementing higher education programs in medical informatics / edited by T.V. Zarubina, B.A. Kobrinsky. - 2nd ed., revised and supplemented; Moscow: GEOTAR-Media, 2022.

Additional readings:

1. Omelchenko Vitaly Petrovich. Information Technologies in Professional Activities: textbook / V.P. Omelchenko, A.A. Demidova. - Electronic text data. - Moscow: GEOTAR-Media, 2022. - 416 p.
2. Nikitina, T. P. Programming. Python Basics for Engineers: study guide for universities / T. P. Nikitina, L. V. Korolev. — 2nd ed., revised. — St. Petersburg: Lan, 2025. — 156 p. — ISBN 978-5-507-50668-2. — Text: electronic // Lan: electronic library system.
3. Yantsev, V. V. Web Programming in Python: study guide for universities / V. V. Yantsev. — 3rd ed., revised. — St. Petersburg: Lan, 2024. — 180 p. — ISBN 978-5-507-48364-8. — Text: electronic // Lan: electronic library system.

Internet resources:

1. RUDN ELS and third-party ELS accessible to university students under signed agreements:
   - RUDN Electronic Library System https://mega.rudn.ru/MegaPro/Web
   - "University Library Online" http://www.biblioclub.ru
   - "Yurayt" ELS http://www.biblio-online.ru
   - "Student Consultant" ELS www.studentlibrary.ru
   - "Znanium" ELS https://znanium.ru/

2. Databases and search engines:
   - Sage https://journals.sagepub.com/
   - Springer Nature Link https://link.springer.com/
   - Wiley Journal Database https://onlinelibrary.wiley.com/
   - Lens.org scientometric database https://www.lens.org

Educational and methodological materials for independent work of students:

1. Course of lectures on the discipline "Medical Informatics".

- all educational and methodological materials for independent work are placed in accordance with the current procedure on the discipline page in the TUIS (Telecommunications Training Information System**).**

8. EVALUATION TOOLKIT AND GRADE SYSTEM FOR ASSESSMENT

Assessment and evaluation toolkit (ET), marking/grading criteria (point-rating system (PRS)* of competences in the discipline « Medical Informatics » are presented in the Appendix to this course syllabus of the discipline.

* - ET and PRS are formed on the basis of the requirements of the relevant local regulatory act of the RUDN

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