Budgetary institution of higher education

Khanty-Mansiysk Autonomous Okrug-Yugra
"Surgut State University"

APPROVED

Vice-Rector for UMR

_____E.V. Konovalova

June 13, 2024, UMC Minutes No. 5

Medical Informatics

Syllabus

Department	**Informatics and computer science**
Curriculum	s310501-ЛечДелоИн-24-1.plx 31.05.01 Medicine
Qualification	**Medical doctor**
Form of training	**full-time**
Total labor intensity	**3 ZET**

Curriculum hours	108	Types of control in semesters:
including:		Exam, 2'term
classroom training	64	
independent work	17	
monitoring hours	27	

Distribution of discipline hours by semesters

Semester	2 (1.2)		Total	
Weeks	17 2/6			
Type of class	UU	RP	UU	RP
Lectures	16	16	16	16
Practical	48	48	48	48
Total Aud.	64	64	64	64
Contact work	64	64	64	64
Self-work	17	17	17	17
Hours for control	27	27	27	27
Total	108	108	108	108

The program was drawn up by the program(s):

Associate Professor, Nazin A.G.

Working program of the discipline

Medical Informatics

developed in accordance with the FSES:

Federal State Educational Standard of Higher Education - specialty 31.05.01 Medicine (Order of the Ministry of Education and Science of Russia from 12.08.2020 № 988).

is based on the curriculum:

31.05.01 Medicine
Specialization: Medicine
approved by the educational-methodical council of the university from 13.06.2024 protocol № 5.

The working program was approved at the meeting of the department
Informatics and computer science

Head of the Department Candidate of Physics and Mathematics Lysenkova S.A.

	1. OBJECTIVES OF MASTERING THE DISCIPLINE
1.1	Study of information technologies, methods of creating models used to solve standard problems of professional activity, analyzing and presenting medical information, conducting statistical analysis of medical information in compliance with the basic requirements of information security.

	2. PLACE OF THE DISCIPLINE IN THE STRUCTURE OF THE EDUCATIONAL PROGRAM	
AOP cycle (section):	B1.O.04.	
2.1	**Requirements for the preliminary training of the learner:**	
2.1.1	School course "Informatics"	
2.1.2	Physics, math	
2.2	**Disciplines and practices for which the mastering of this discipline (module) is necessary as a precursor:**	
2.2.1	Basics of project activities	
2.2.2	Educational practice, research work (obtaining primary skills of research work)	

3. COMPETENCIES OF THE STUDENT, FORMED AS A RESULT OF MASTERING THE DISCIPLINE (MODULE)

OPK-10.1: Demonstrates knowledge of the mathematical foundations of medical statistics to solve their professional problems

OPK-11.3: Demonstrates readiness to analyze and publicly present medical information based on evidence-based medicine

PC-11.1: Able to utilize digital technologies and information tools to meet personal, educational and professional needs

PC-11.2: Able to set problems and develop solution algorithms using programming tools

PC-11.3: Able to use mathematical methods and models to solve professional problems and develop new approaches

As a result of mastering the discipline, the student must

3.1	**Know:**
3.1.1	Basic methods of analyzing and publicly presenting medical information based on evidence-based medicine.
3.1.2	Mathematical foundations of medical statistics for solving professional problems.
3.1.3	Current digital technology and information tools to meet personal, educational, and professional needs.
3.1.4	Methods of solving problems and creating algorithms for their solution using programming tools
3.1.5	Methods of creating mathematical models for solving professional problems
3.2	**Skill:**
3.2.1	Analyze experimental data and carry out their statistical processing.

3.2.2	Use the Internet to search for scientific information.				
3.2.3	Analyze scientific medical information.				
3.2.4	Utilize information technology to prepare a public presentation of it.				
3.2.5	Use algorithmic and programming techniques to solve problems.				
3.2.6	Use mathematical methods to create models to solve problems.				

4. STRUCTURE AND CONTENT OF THE DISCIPLINE (MODULE)					
Class code	Name of sections and topics /type of lesson/	Semester / Course	Hours	Competent-nations	Literature	Note
	Section 1: Introduction to medical informatics. General characteristics of the processes of collection, storage and processing of information used to solve the tasks of professional activity					
1.1	Concepts of medical informatics, medical information, types and features of medical information. Coding of information. /Lec/.	2	2	PK-11.1 PK-11.3	L1.1L2.1L3.1 E1 E2 E3 E4	
1.2	Analog and digital medical data. Coding of black and white and color medical images. Number systems. Measuring the amount of information in different coding systems. /Pr/.	2	4	PK-11.1 PK-11.3	L1.2L2.1L3.2. E1 E2 E3 E4	
1.3	Working with the Task Manager. Explorer program. The concept of a directory (folder), file (document). Creating a directory tree. Mouse control techniques. Copying, moving, deleting files. /Pr/.	2	2	PK-11.1 PK-11.3	L1.2 L2.1 L3.1 L3.2 E1 E2 E3 E4	
	Section 2: Basic information about hardware and software used for storing, transforming and transmitting information. Basic technologies of information transformation					
2.1	Hardware basics. /Lec/.	2	2	PK-11.1 PK-11.3	L1.2L2.1L3.2. E1 E2 E3 E4	
2.2	Word program. Word processor settings, creating, editing and formatting a document. Tables, lists, footnotes. Hyperlinks. Columns, table of contents. /Pr/.	2	3	OPK-10.1 OPK-11.3 PK-11.1 PK -11.3	L2.1L3.2 E1 E2 E3 E4	
2.3	Abstracting scientific articles: assess the problem that the authors study, note the methods of mathematical (statistical) analysis that are used in scientific articles. Abstract to draw up in the program Word. /Pr/.	2	3	OPK-11.3 PK-11.1 PK-11.3	L1.2L2.1L3.2. E1 E2 E3 E4	
2.4	Preparation for a public presentation on the topic: "Methods of analysis used in scientific articles published in the Bulletin of SURGU. Medicine" /Cp/.	2	7	OPK-11.3 PK-11.3	L1.2L2.1 E1 E2 E3 E4	
2.5	Software Fundamentals, OS. /Lec/.	2	2	PC-11.3	E1 E2 E3 E4	

2.6	A study of the history of the development of medicine. The technology of using a text editor. /Pr/.	2	3	OPK-10.1 OPK-11.3 PK-11.3	L1.2L2.1L3.2. E1 E2 E3 E4	
2.7	Excel. Data filling, primary data processing using formulas. /Pr/.	2	3	OPK-10.1 PK-11.1 PK -11.3	L1.1L2.1L3.2. E1 E2 E3 E4	
2.8	Excel. Filling in data that obeys a certain distribution law. Working with Excel as a database. Sorting, filtering. /Pr/.	2	3	OPK-10.1 PK-11.3	L1.1L2.1L3.2. E1 E2 E3 E4	
	Section 3: Data visualization and processing. The concept of statistical processing.					
3.1	Basic concepts of mathematical statistics, general population, sampling. Laws of distribution. Parametric and nonparametric criteria. /Lec/.	2	4	OPK-10.1 PK-11.3	L1.2L2.1L3.2. E1 E2 E3 E4	
3.2	Visualization as a tool for primary data analysis. /Pr/.	2	2	OPK-10.1 PK-11.1 PK -11.3	L1.1L2.1L3.2. E1 E2 E3 E4	
3.3	Data processing using distribution histogram. /Pr/.	2	2	PK-11.1 PK-11.3	L1.1L2.1L3.1 E1 E2 E3 E4	
3.4	Basic sampling characteristics. Using the Analysis Package and functions in Excel. /Pr/.	2	2	OPK-10.1 PK-11.1 PK -11.3	L1.1L2.1L3.2. E1 E2 E3 E4	
3.5	Properties of the normal law of distribution. Checking the distribution for obedience to the normal law of distribution /Pr/	2	2	OPK-10.1 PK-11.2 PK-11.3	L1.1L2.1L3.2. E1 E2 E3 E4	
3.6	Problem statement and development of a solution algorithm. /Cp/.	2	2	OPK-10.1 PK-11.2 PK-11.3	L2.1L3.2 E1 E2 E3 E4	
	Section 4: Medical information systems.Mathematical modeling.					
4.1	Medical Information Systems. Information protection in MIS. /Lec/.	2	2	PK-11.1 PK-11.3	L1.1L2.1L3.1 E1 E2 E3 E4	
4.2	National standard "Electronic medical history". Classification of "EIB" and "EPMH" systems. Preparation of medical documentation. /Pr/.	2	2	OPK-10.1 PK-11.1 PK -11.3	L1.1L2.1L3.2. E1 E2 E3 E4	
4.3	Modeling of biological processes. /Pr/.	2	2	OPK-10.1 OPK-11.3 PK-11.3	L1.1L2.1L3.2. E1 E2 E3 E4	
4.4	Searching for information on the site of the federal electronic medical library /Cp/	2	5	PC-11.3	L1.1L3.2 E1 E2 E3 E4	
4.5	Determination of reliability of differences. Null hypothesis, level of significance, Student's criterion. /Pr/.	2	3	OPK-10.1 OPK-11.3 PK-11.1 PK-11.2 PK-11.3	L1.1L2.1 E1 E2 E3 E4	
	Section 5: Telecommunication technologies and Internet resources and their use in medicine. Modern information threats.					

5.1	Local and global computer networks. Protocols, architecture of networks. Basic services of the Internet /Lecture/	2	2	PK-11.1 PK-11.3	L1.1L2.1L3.2. E1 E2 E3 E4	
5.2	Search for information in the global network by topic /Pr/	2	2	PK-11.1 PK-11.3	L1.1L2.1L3.2. E1 E2 E3 E4	
5.3	Correlation analysis. Solving problems of medical and biological topics with the preliminary development of the algorithm of the solution. /Pr/	2	4	OPK-11.3 PK-11.3	L1.2L2.1L3.2. E1 E2 E3 E4	
5.4	Preparation for public presentation of the results of work /Cf/	2	3	OPK-11.3 PK-11.1 PK-11.3	L1.2L2.1L3.2. E1 E2 E3 E4	
5.5	Information protection. Information trace. /Lec/	2	2	OPK-10.1 PK-11.3	L1.1L2.1L3.2. E1 E2 E3 E4	
5.6	Solving problems of medical and biological topics. Development of the algorithm. /Pr/.	2	3	PK-11.2 PK-11.3	L1.1L2.1L3.1 E1 E2 E3 E4	
5.7	Regression Analysis. /Pr/.	2	3	OPK-10.1 PK-11.3	L1.2L2.1L3.2.	
5.8	Final control work /Counter.rab.rab./	2	0	OPK-10.1 OPK-11.3 PK-11.1 PK-11.2 PK-11.3	L1.1 L1.2L2.1L3.2 E1 E2 E3 E4	Assignment for the test
5.9	/Example/.	2	27	OPK-10.1 OPK-11.3 PK-11.1 PK-11.2 PK-11.3	L1.1 L1.2 L2.1 L3.1 L3.2	Examination task

5. EVALUATION TOOLS
5.1 Assessment materials for current control and interim certification
Submitted in a separate document
5.2 Assessment materials for diagnostic testing
Submitted in a separate document

6. EDUCATIONAL-METHODICAL AND INFORMATIONAL SUPPORT OF THE DISCIPLINE (MODULE)				
6.1 Recommended reading				
6.1.1 Basic literature				
	Authors, compilers	Title	Publisher, year	Quantity
Л1.1	Omelchenko V.P., Demidova A.A.	Medical informatics: textbook	Moscow: GEOTAR-Media, 2016, electronic resource	1
Л1.2	B. P. Omelchenko, A. A. Demidova.	Medical informatics Text : electronic : textbook	Moscow : GEOTAR-Media, 2016, URL : electronic resource	1
6.1.2 Additional literature				
	Authors, compilers	Title	Publisher, year	Quantity

	Authors, compilers	Title	Publisher, year	Quantity
Л2.1	Zarubina T. B. [et al.]	Medical informatics - Text : electronic : textbook	Moscow : GEOTAR-Media, 2018, electronic resource	1

6.1.3 Methodological developments				
	Authors, compilers	Title	Publisher, year	Quantity
Л3.1	Almazova E.G.	Mathematical methods of clinical data processing: teaching aid	SurSU Publishing Center, 2018, electronic resource	49
Л3.2	Almazova E.G.	mathematical methods of clinical data processing: teaching aid	SurSU Publishing Center, 2018, electronic resource	49

6.2 List of resources of the information and telecommunication network "Internet"	
Э1	Federal Electronic Medical Library https://femb.ru/request
Э2	"Medvuz.RU" (educational medical server) http://www.medvuz.ru/
Э3	Clinical Guidelines Rubric https://cr.minzdrav.gov.ru/
Э4	WHO https://www.who.int/
Э5	VBA macro
6.3.1 List of software	
6.3.1.1	Windows operating system,
6.3.1.2	Browser programs, Microsoft Office application programs
6.3.2 List of information reference systems	
6.3.2.1	http://www.garant.ru
6.3.2.2	http://www.consultant.ru

7. MATERIAL AND TECHNICAL SUPPORT OF THE DISCIPLINE (MODULE)	
7.1	The classroom for lectures, seminars (laboratory classes), group and individual consultations, current control and interim certification is equipped with: a set of specialized furniture, marker (chalk) board, a set of portable multimedia equipment - computer, projector, projection screen, computers with Internet access and access to the electronic information and educational environment. Access to the Internet and the electronic information environment of the organization is provided.