

GENERAL EDUCATION MODULE

Medical Informatics

Syllabus

Department **Informatics and Computer Science**

Curriculum s310501-ЛечДелоИн-23-1.plx
Specialty 31.05.01 General Medicine

Qualification **General Practitioner**

Form of education **full-time**

Total (in credits) **2**

Total academic hours 72

including:

classes 64

self-study 8

Control:

Credit/mark, 2nd term

Course outline in terms

Academic year (Term)	2 (1.2)		Total	
	Cur	Syl		
Weeks	17 2/6		Cur	Syl
Lectures	16	16	16	16
Practical	48	48	48	48
Total classes	64	64	64	64
Contact	64	64	64	64
Self-study	8	8	8	8
Total	72	72	72	72

The Syllabus is compiled by:

*Associate Professor, D.A. Fedorov*_____

The Syllabus

Medical Informatics

Developed in accordance with the Federal State Educational Standard:

Federal State Educational Standard of higher education in the specialty 31.05.01 Medicine (Order of the Ministry of Education and Science of the Russian Federation on 12.08.2020 № 988)

Based on the Curriculum:

31.05.01 General Medicine

Specialization: General Medicine

Approved by the Academic Council of Surgut State University, 15.06.2023 Record № 5.

The Syllabus was approved by the department

Informatics and Computer Science

Head of Department, Associate Professor, Fedorov D.A. _____

1. COURSE OBJECTIVES	
1.1	The aim of the course is to 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. COURSE OVERVIEW	
Course code (in curriculum):	B1.O.04.
2.1 Assumed background:	
2.1.1	School course "Informatics"
2.2 Post-requisite courses and practice:	
2.2.1	Educational practice, research work (obtaining primary skills of research work)
2.2.2	Fundamentals of project activity in healthcare

3. COMPETENCES UPON COMPLETION OF THE COURSE (MODULE)	
GPC-10.1: Demonstrates knowledge of the mathematical foundations of medical statistics to solve their professional problems	
GPC-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	

By the end of the course students 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 Be able to:	
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.
3.3	Have skills of:
3.3.1	storing, transforming and processing of medical information using text and table editors.
3.3.2	searching for scientific information on the Internet, library systems, and evidence-based medicine sites.
3.3.3	creating mathematical models for problem solving.
3.3.4	algorithmization and programming.

4. STRUCTURE AND CONTENTS OF THE COURSE (MODULE)						
Class code	Topics /Class type	Term/Academic year	Academic hours	Competences	Literature	Interactive
	Section 1: Introduction to medical informatics. General characteristics of the processes of collection, storage and processing of information used to solve					
1.1	Concepts of medical informatics, medical information, types and features of medical information. Coding of information. /Lec/	2	2	PC-11.1	1.2 2.1 3.1. 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	PC-11.1 PC-11.3	1.1 2.1 3.2. 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	PC-11.1	1.2 2.1 1.1. 3.2 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	PC-11.1	1.1 2.1 3.2. 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	GPC-10.1 GPC-11.3 PC-11.1	2.1 3.2 E1 E2 E3 E4	

2.3	Abstracting scientific articles: evaluate 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	GPC-11.3 PC-11.1	1.1 2.1 3.2. 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" /Self-Study/	2	2	GPC-11.3	1.1 2.1 E1 E2 E3 E4	
2.5	Software Fundamentals, OS. /Lec/	2	2		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	GPC-10.1 GPC-11.3	1.1 2.1 3.2. E1 E2 E3 E4	
2.7	Excel. Data filling, primary data processing using formulas. /Pr/	2	3	GPC-10.1 PC-11.1	1.1 2.1 3.2. 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	GPC-10.1	1.1 2.1 3.2. 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	GPC-10.1	1.1 2.1 3.2. E1 E2 E3 E4	
3.2	Visualization as a tool for primary data analysis. /Pr/	2	2	GPC-10.1 PC-11.1 PC -11.3	1.1 2.1 3.2. E1 E2 E3 E4	
3.3	Data processing using distribution histogram. /Pr/	2	2	PC-11.1 PC-11.3	1.2 2.1 3.1. E1 E2 E3 E4	
3.4	Basic sampling characteristics. Using the Analysis Package and functions in Excel. /Pr/	2	2	GPC-10.1 PC-11.1	1.1 2.1 3.2. 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	GPC-10.1 PC-11.2	1.1 2.1 3.2. E1 E2 E3 E4	
3.6	Problem statement and development of a solution algorithm. /Self-study/	2	2	GPC-10.1 PC-11.2 PC-11.3	2.1 3.2 E1 E2 E3 E4	
	Section 4: Medical information systems. Mathematical modeling.					

4.1	Medical Information Systems. Information protection in MIS. /Lec/	2	2	PC-11.1 PC-11.3	1.2 2.1 3.1. E1 E2 E3 E4	
4.2	National standard "Electronic medical history". Classification of "EIB" and "EPMH" systems. Preparation of medical documentation. /Pr/	2	2	GPC-10.1 PC-11.1	1.1 2.1 3.2. E1 E2 E3 E4	
4.3	Modeling of biological processes. /Pr/	2	2	GPC-10.1 GPC-11.3	1.1 2.1 3.2. E1 E2 E3 E4	
4.4	Searching for information on the website of the federal electronic medical library /Self-study/	2	2		1.2 3.2 E1 E2 E3 E4	
4.5	Determination of reliability of differences. Null hypothesis, level of significance, Student's criterion. /Pr/	2	2	GPC-10.1 PC-11.1	1.1 2.1 3.2. E1 E2 E3 E4	
4.6	Macros in Excel. /Pr/	2	1	PC-11.2	E5	
	Section 5: Telecommunication technologies and Internet resources and their use in medicine. Modern					
5.1	Local and global computer networks. Protocols, architecture of networks. Basic services of the Internet /Lec/	2	2	PC-11.1 PC-11.3	1.1 2.1 3.2. E1 E2 E3 E4	
5.2	Search for information in the global network by topic /Pr/	2	2	PC-11.1	1.1 2.1 3.2. E1 E2 E3 E4	
5.3	Correlation analysis. Solving problems of medical and biological topics. Development of the algorithm. /Pr/	2	4	GPC-11.3	1.1 2.1 3.2. E1 E2 E3 E4	
5.4	Preparation for public presentation of the results of work /Self-study/	2	2	GPC-11.3 PC-11.1	1.1 2.1 3.2. E1 E2 E3 E4	
5.5	Information protection. Information trace. /Lec/	2	2	GPC-10.1	1.1 2.1 3.2. E1 E2 E3 E4	
5.6	Solving problems of medical and biological topics. Development of the algorithm. /Pr/	2	3	PC-11.2 PC-11.3	1.2 2.1 3.1. E1 E2 E3 E4	
5.7	Regression Analysis. /Pr/	2	3	GPC-10.1	1.1 2.1 3.2.	
5.8	Test	2	0	GPC-10.1 GPC-11.3 PC-11.1 PC-11.2 PC-11.3	1.2 1.1 2.1 3.2. E1 E2 E3 E4	

5.9	Credit	2	0	GPC-10.1 GPC-11.3 PC-11.1 PC-11.2 PC-11.3	1.2 1.1 2.1 3.1 3.2	
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5. ASSESSMENT TOOLS						
5.1 Assessment tools for midterm assessment						
Presented by a single document						
5.2 Assessment tools for diagnostic testing						
Presented by a single document						

6. COURSE (MODULE) RESOURCES				
6.1. Recommended Literature				
6.1.1 Core				
	Authors	Title	Publish., year	Quantity
1.1	B. P. Omelchenko, A. A. Demidova.	Medical informatics Text : electronic : textbook	Moscow : GEOTAR-Media, 2016, URL : Electronic resource	0
1.2	Omelchenko V.P., Demidova A.A.	Medical informatics: textbook	1. Moscow: GEOTAR-Media, 2016, Electronic resource	1
6.1.2 Supplementary				
	Authors	Title	Publish., year	Quantity
2.1	Zarubina T. B. [et al.]	Medical informatics - Text : electronic : textbook	Moscow : GEOTAR-Media, 2018, Electronic resource	0
6.1.3 Methodical development				
	Authors	Title	Publish., year	Quantity
3.1	Almazova E.G.	Mathematical methods of clinical data processing: teaching aid	Publishing Center of Surgut State University, 2018, Electronic resource	49
3.2	Almazova E.G.	Mathematical methods of clinical data processing: teaching aid	Publishing Center of Surgut State University, 2018, Electronic resource	49
6.2 Internet resources				
E1	https://femb.ru/request			
E2	http://www.medvuz.ru/			
E3	https://cr.minzdrav.gov.ru/			
E4	https://www.who.int/			
E5	VBA macro			
6.3.1 Software				
6.3.1.1	Windows operating system			

6.3.1.2	Browser programs, Microsoft Office application programs
6.3.2 Information Referral systems	
6.3.2.1	https://www.rosmedlib.ru/
6.3.2.2	http://www.elibrary.ru
6.3.2.3	https://sberbankvip.alpinadigital.ru

7. MATERIAL AND TECHNICAL SUPPORT OF 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 electronic information environment of the organization is provided.