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MINISTRY OF HEALTH PROTECTION OF UKRAINE

ODESSA NATIONAL MEDICAL UNIVERSITY

Department of Physiology and Biophysics

I APPROVE
Vice-rector for scientific and pedagogical work
Eduard BURYACHKIVSKY
September 1, 2023



**WORKING PROGRAM OF EDUCATIONAL DISCIPLINE
"MEDICAL INFORMATICS"**

Level of higher education: second (master's)

Branch of knowledge: 22 "Health care"

Specialty: 222 "Medicine"

Educational and professional program: "Medicine"

2023

The work program is compiled on the basis of the educational and professional program "Medicine" for the training of specialists of the second (master's) level of higher education in the specialty 222 "Medicine" of the field of knowledge 22 "Health care", approved by the Scientific Council of ONMedU (protocol No. 8 of June 29, 2023).

Developers:

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The work program was approved at the meeting of the Department of
Physiology and Biophysics

Protocol No. 1 of August 28, 2023.

Head of the Physiology and Biophysics Department, honored doctor of Science of Ukraine, Doctor of Medicine, Professor Leonid GODLEVSKY

Agreed with the guarantor of OPP "Medicine" - Valery MARICHEREDA

Approved by the subject cyclical methodical commission for medical and biological disciplines of ONMedU

Protocol No. 1 of August 28, 2023.

Head of the subject cyclic methodical commission for medical and biological disciplines, Doctor of Medicine, prof. Leonid GODLEVSKY

Reviewed and approved at the meeting of the department

Protocol No. ___ of "___" _____ 20__

Head of Department _____

(signature)

(First Name Surname)

1. Description of the academic discipline

Name of indicators	Field of knowledge, specialty, specialization, level of higher education	Characteristics of the academic discipline
Total number:	Field of knowledge: 22 "Health care" Specialty: 222 "Medicine" Level of higher education: second (master's)	<i>Full-time form of study</i> <i>Compulsory discipline</i>
Credits - 3		<i>Year of training 1</i>
Hours: - 90		<i>Semester I</i>
Content modules: - 4		<i>Lectures 8 hours.</i>
		<i>Seminar 0 (hours)</i>
		<i>Practical 36 (hours)</i>
		<i>Laboratory 0 hours</i>
		<i>Independent work 46 (hours)</i> <i>, including individual tasks 12 hours.</i>
		<i>Final control form: Dif.</i>

2. The purpose and tasks of the educational discipline — competences, program learning outcomes

Purpose: Mastering by the student of basic knowledge in the field of information technologies to promote the formation of competences in the field of professional activity and laying the foundation for students to study other theoretical and clinical disciplines. Formation of skills to apply knowledge from medical informatics in the process of further education and in professional activity.

Task

1. Acquisition of skills for working with medical and biological data. Mastering methods of computer processing of medical and biological information.
2. Mastering the ability to determine statistical methods necessary for processing experimental data when solving the most common typical problems and using them.
3. Compilation of algorithms for solving medical and biological problems.
4. Application of the latest information technologies for obtaining, processing and visualization of medical and biological data.

The process of studying the discipline is aimed at forming elements of the following competences:

General (GC):

- IC2. Ability to learn and master modern knowledge
- GC3. Ability to apply knowledge in practical situations
- GC10. Ability to use information and communication technologies
- GC11. Ability to search, process and analyze information from various sources
- GC16. Ability to evaluate and ensure the quality of performed work of

Special/professional (SC/PC):

SC16. Ability to maintain medical documentation, including electronic forms.
SC20. Ability to conduct epidemiological and medical statistical studies of the health of the population; processing of social, economic and medical information.
SC23. Ability to develop and implement scientific and applied projects in the field of health care.
SC25. Adherence to professional and academic integrity, bear responsibility for the reliability of the obtained scientific results.

Program learning outcomes (PLO):

PLO22. Apply modern digital technologies, specialized software, and statistical methods of data analysis to solve complex healthcare problems.

As a result of studying the academic discipline, the student of higher education should:

Know:

- the possibilities of using information technologies and computers in medicine;
- principles of formalization and algorithmization of medical problems, principles of modeling in biology and medicine;

Be able to:

- interpret the basic concepts of medical informatics;
- apply application programs for processing medical data and medical information;
- analyze the role of information, communication and computer technologies in medicine;
- interpret the basic principles of telemedicine;
- demonstrate the skills of using DBMS in the processing of medical and biological data;
- demonstrate basic skills in using basic medical Internet resources.
- demonstrate basic skills of working with a PC and searching for medical information using information technologies;

3. Content of the educational discipline

Content module 1. Basic concepts of medical informatics. The computer in the activity of the future doctor.

Topic 1. Safety technology. Input control. Introduction and structure of medical informatics.

Safety equipment. Computer testing. Course objectives. Course structure. Basic tasks and components of medical informatics (MIN). Data and information. Computer programs-applications in the healthcare system

Topic 2. Information transfer. Network technologies. Basics of telemedicine.

Communication Sender, channel, recipient. Receivers and converters of information. Carriers of information. Properties of information. Entropy of information. Technical and software of Internet communications. Communication in the health care system. Basic principles of telemedicine.

Topic 3. Computer data: data types, processing and management.

Information processing systems: user, input, user interface, data processing and presentation. Database management systems (DBMS). Data structure. DBMS functions. Data models. Data management Data storage. DBMS models. Types of models: hierarchical, relational and network-type models.

Content module 2. Medical data. Information processing and analysis methodology.

Topic 4. Coding and classification.

Classification: types, classification, definitions, goals, principles. Codes: coding, numerical and mnemonic codes, hierarchical and combinational codes, mapping codes History of classification and coding. Classification systems. Problems of classification and coding.

Topic 5. Analysis of biosignals. Biosignal processing methods.

Registration, transformation and classification of biosignals. Types of signals. Periodic, stationary and non-stationary signals. Applied application of biosignal analysis.

Topic 6 Visualization of medical and biological data. Processing and analysis of medical images.

Means of receiving images. Processing of medical images. Problems of image processing and analysis. Image transformation. General and local image transformation. Modern trends in image processing. Processing of two-dimensional and three-dimensional medical images.

Topic 7. Methods of biostatistics.

Data description: qualitative ordinal, nominal and quantitative data. Parameter estimation and hypothesis testing. Statistical data analysis. Control of the stage of calculation and graphic work.

Content module 3. Medical knowledge and decision-making.

Topic 8. Decision support methods. Strategies for obtaining medical knowledge.

Types of medical knowledge. Training people and "training" computers. Decision support systems. Knowledge base. Information needs and ways to solve them. Types of decision support systems and medical knowledge bases.

Topic 9. Formal logic in solving the problems of diagnosis, treatment and prevention of diseases.

Logical operations and truth tables. Logical operators and expressions. Algebra of logic. Binary number system and logic.

Topic 10. Formalization and algorithmization of medical problems.

Basics of algorithmization of medical problems. Algorithms and their properties. Ways of presenting algorithms. Types of algorithms Compilation of the structural diagram of a simple and branched algorithm Compilation of the structural diagram of an algorithm with an internal loop

. Topic 11. Clinical decision support systems. Means of forecasting. Modeling of the decision support system.

Application of clinical decision-making systems. Types of systems. Forecasting tools Decision support with simple forecasting tools. Presentation of decision support systems. Expert systems. Building a knowledge base and structuring. Reuse of ontologies. Modern decision-making system architecture.

Topic 12. Evidence-based medicine.

Use of evidence in making medical decisions. Sources of available evidence in medicine.

Content module 4. Systems, interactions with patients, institutional information systems in health care.

Topic 13. Types of information systems in the field of health care. Hospital information systems and their development.

Public health and health care. Modeling and models of the health care system (HOS) Information requirements. Hospital information systems (GIS): clinical use and technical implementation. History of GIS development. The future of GIS. GIS functions. Concept of GIS. GIS architecture. Application of GIS Examples of GIS. Data access and protection. Administrative management. Clinical systems in various areas of health care.

Topic 14. Individual medical cards. Structuring the content of electronic medical records (EMC).

Traditional and electronic medical records (electronic history History of development. Structure of data entry: dynamics, interface, adaptation to the consumer. General structure of EMC. Implementation of EMC. Use of EMC data.

Topic 15. Information resources of the health care system.

Information resources of the health care system. Characteristics and features of information resources of the health care system. Areas of information resources of the health care system. Health information networks with open access. Information resources. Administrative systems. Registers. Epidemiological surveillance. Banks of organs, tissues and blood. Use of information resources in evidence-based medicine.

Topic 16. Ethical and legal principles of information management in the health care system.

Information protection - security, privacy and confidentiality of medical information systems. Threats Selection of necessary measures. Legislation and regulation.

Differential calculation.

4. Structure of the educational discipline

Name of the topic	Number of hours					
	Total	Lectur es	Seminar s	Practi cal	laborato ries	SRS
Content module 1. Basic concepts of medical informatics. The computer in the activity of the future doctor						
. Topic 1. Safety technology. Input control. Introduction and structure of medical informatics	5	2	0	2	0	1
Topic.2. Transfer of information. Network technologies. Basics of telemedicine.	4	0	0	2	0	2
Topic 3. Computer data: data types, processing and management.	6	0	0	2	0	4
<i>Total for content module 1</i>	15	2	0	6	0	7
Content module 2. Medical data. Information processing and analysis methodology.						
Topic 4. Coding and classification..	5	0	0	2	0	3
Topic 5. Analysis of biosignals Methods of processing biosignals	8	0	0	4	0	4
Topic 6. Visualization of medical and biological data. Processing and analysis of medical images..	5	0	0	2	0	3
Topic 7. Biostatistics methods..	11	2	0	4	0	5
<i>Total for content module 2</i>	29	2	0	12	0	15
Content module 3. Medical knowledge and decision-making.						
Topic 8. Decision support methods. Strategies for obtaining medical knowledge.	6	2	0	2	0	2
Topic 9. Formal logic in solving the problems of diagnosis, treatment and prevention of diseases.	4	0	0	2	0	2

Topic 10. Formalization and algorithmization of medical problems.	4	0	0	2	0	2
Topic 11. Clinical decision support systems. Means of forecasting. Modeling of the decision support system.	7	2	0	2	0	3
Topic 12. Evidence-based medicine.	5	0	0	2	0	3
<i>Total for content module 3</i>	26	4	0	10	0	12
Content module 4. Systems, interactions with patients, institutional information systems in health care.						
Topic 13. Types of information systems in the field of health care. Hospital information systems and their development.	6	0	0	2	0	4
Topic 14. Individual medical cards. Structuring the content of electronic medical records (EMC).	4	0	0	2	0	2
Topic 15. Information resources of the health care system.	6	0	0	2	0	4
Topic 16. Ethical and legal principles of information management in the health care system.	4	0	0	2	0	2
<i>by content module 4</i>	20	0	0	8	0	12
Total hours	90	8	0	36	0	46

5. Topics of lectures / seminars / practical / laboratory classes

5.1. Topics of lecture sessions

No.	Name of the topic	Number of hours
1	Lecture-1 Basic concepts of medical informatics Course objectives Course structure. Basic tasks and components of medical informatics (MIN). Data and information. Basic concepts of medical informatics. Bioinformatics and its role in modern diagnostics and treatment. Information processes as the basis of life.	2
2	Lecture-2 Expert systems and modeling in biology and medicine. Principles of construction and operation of decision support systems in medicine. Expert systems. Components of the expert system and their functions. Logical operations and truth tables. Bayes formula. Modeling of physiological and pathological processes, international programs for modeling the human body. "Physiological patient".	2
3	Lecture 3 Basics of biostatistics and evidence-based medicine.	2

	Data description: qualitative ordinal, nominal and quantitative data. General population and sample. Parameters and statistics. Distribution laws of sample statistics. Parameter estimation and hypothesis testing. Statistical data analysis. Use of evidence in making medical decisions. Sources of available evidence in medicine.	
4	Lecture-4. New information technologies in medicine. New technologies for collecting and analyzing medical information using the functionality of mobile communications and smartphone software. Neurolink system. Advances in genomics and proteomics as an integral part of personalized medicine.	2

5.2. Topics of seminar classes

classes are provided.

5.3. Topics of practical lessons

No.	Name of the topic	Number of hours
1	Topic 1. Practical lesson 1. Safety technology. Input control. Introduction and structure of medical informatics. Safety equipment. Computer testing. Course objectives. Course structure. Basic tasks and components of medical informatics (MIN). Data and information. Computer programs-applications in the healthcare system	2
2	Topic 2. Practical lesson 2. Transfer of information. Network technologies. Basics of telemedicine. Communication Sender, channel, recipient. Receivers and converters of information. Carriers of information. Properties of information. Entropy of information. Technical and software of Internet communications. Communication in the health care system. Basic principles of telemedicine.	2
3	Topic 3. Practical lesson 3. Computer data: data types, processing and management. Information processing systems: user, input, user interface, data processing and presentation. Database management systems (DBMS). Data structure. DBMS functions. Data models. Data management Data storage. DBMS models. Types of models: hierarchical, relational and network-type models.	2
4	Topic 4. Practical lesson 4. Coding and classification. Classification: types, classification, definitions, goals, principles. Codes: coding, numerical and mnemonic codes, hierarchical and combinational codes, mapping codes History of classification and coding. Classification systems. Problems of classification and coding.	2
5	Topic 5. Practical lesson 5. Analysis of biosignals Methods of processing biosignals. Registration, transformation and classification of biosignals. Types of signals. Periodic, stationary and non-stationary signals. Applied application of biosignal analysis.	4
6	Topic 6. Practical lesson 6.	2

	<p>Visualization of medical and biological data. Processing and analysis of medical images. Means of receiving images. Processing of medical images. Problems of image processing and analysis. Image transformation. General and local image transformation. Modern trends in image processing. Processing of two-dimensional and three-dimensional medical images.</p>	
7	<p>Topic 7. Practical lesson 7.</p> <p>Methods of biostatistics. Data description: qualitative ordinal, nominal and quantitative data. Parameter estimation and hypothesis testing. Statistical data analysis. Control of the stage of calculation and graphic work.</p>	4
8	<p>Topic 8. Practical lesson 8.</p> <p>Decision support methods. Strategies for obtaining medical knowledge. Types of medical knowledge. Training people and "training" computers. Decision support systems. Knowledge base. Information needs and ways to solve them. Types of decision support systems and medical knowledge bases.</p>	2
9	<p>Topic 9. Practical lesson 9.</p> <p>Formal logic in solving the problems of diagnosis, treatment and prevention of diseases. Logical operations and truth tables. Logical operators and expressions. Algebra of logic. Binary number system and logic.</p>	2
10	<p>Topic 10. Practical class 10.</p> <p>Formalization and algorithmization of medical problems. Basics of algorithmization of medical problems. Algorithms and their properties. Ways of presenting algorithms. Algorithm types Compilation of a structural diagram of a simple and branched algorithm Compilation of a structural diagram of an algorithm with an internal loop..</p>	2
11	<p>Topic 11. Practical lesson 11.</p> <p>Clinical decision support systems. Means of forecasting. Modeling of the decision support system. Application of clinical decision-making systems. Types of systems. Forecasting tools Decision support with simple forecasting tools. Presentation of decision support systems. Expert systems. Building a knowledge base and structuring. Reuse of ontologies. Modern decision-making system architecture.</p>	2
12	<p>Topic 12. Practical lesson 12.</p> <p>Evidence-based medicine. Use of evidence in making medical decisions. Sources of available evidence in medicine.</p>	2
13	<p>Topic 13. Practical lesson 13.</p> <p>Types of information systems in the field of health care. Hospital information systems and their development. Public health and health care. Modeling and models of the health care system (HOS) Information requirements. Hospital information systems (GIS): clinical use and technical implementation. History of GIS development. The future of GIS. GIS functions. Concept of GIS. GIS architecture. Application of GIS Examples of GIS. Data access and protection. Administrative management. Clinical systems in various areas of health care.</p>	2
14	<p>Topic 14. Practical lesson 14.</p> <p>Individual medical cards. Structuring the content of electronic medical records (EMC). Traditional and electronic medical records (electronic history History of development. Structure of data entry: dynamics, interface, adaptation to the consumer. General structure of EMC. Implementation of EMC. Use of EMC data.</p>	2
	<p>Topic 15. Practical lesson 15.</p>	2

1 5	Information resources of the health care system. Characteristics and features of information resources of the health care system. Areas of information resources of the health care system. Open access health care information networks. Information resources. Administrative systems. Registers. Epidemiological surveillance. Banks of organs, tissues and blood. Use of information resources in evidence-based medicine.	
1 6	Topic 16. Practical lesson 16. Ethical and legal principles of information management in the health care system. Information protection - security, privacy and confidentiality of medical information systems. Threats Choice necessary measures. Legislation and regulation.	2

5.4. Topics of laboratory classes

L laboratory classes are not provided.

6. Independent work of a student of higher education

N o.	Name of the topic / types of tasks	Number of hours
1	Topic 1. Preparation for a practical lesson 1	1
2	Topic 2. Preparation for a practical lesson 2	2
3	Topic 3. Preparation for a practical lesson 3	4
4	Topic 4 Preparation for a practical lesson 4	3
5	Topic 5. Preparation for a practical lesson 5	4
6	Topic 6. Preparation for a practical lesson 6	3
7	Topic 7. Preparation for a practical lesson 7	5
8	Topic 8. Preparation for a practical lesson 8	2
9	Topic 9 Preparation for a practical lesson 9	2
10	Topic 10. Preparation for a practical lesson 10	2
11	Topic 11. Preparation for a practical lesson 11	3
12	Topic 12. Preparation for a practical lesson 12	3
13	Topic 13. Preparation for a practical lesson 13	4
14	Topic 14. Preparation for a practical lesson 14	2
15	Topic 15. Preparation for a practical lesson 15	4
16	Topic 16. Preparation for a practical lesson 16	2
	Total	46

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7. Teaching methods

Practical lessons: conversation, checking the level of preparation, understanding and assimilation of theoretical material topics by students, discussion of complex issues of the topic, correction of possible mistakes, answers to questions and training exercises aimed at improving students' knowledge.

Independent work: independent work with recommended basic and additional literature, with electronic information resources.

8. Forms of control and assessment methods (including criteria for evaluating learning outcomes)

Current control: oral survey, assessment of practical problem-solving skills, assessment of class activity.

Final control: differential assessment.

The structure of the current assessment in the practical session:

1. Assessment of theoretical knowledge on the topic of the session:
 - methods: survey, problem solving;
 - the maximum score is 5, the minimum score is 3, the unsatisfactory score is 2.
2. Assessment of practical skills on the topic of the lesson:
 - methods: assessment of the correctness of problem solving
 - , the maximum score is 5, the minimum score is 3, the unsatisfactory score is 2.

Current evaluation criteria in the practical session

Evaluation Evaluation	criteria
"5"	The applicant is fluent in the material, takes an active part in discussing and solving a situational clinical problem, confidently demonstrates practical skills during the differential test of a sick child and the interpretation of clinical, laboratory and instrumental research data, expresses his opinion on the subject of the class, demonstrates clinical thinking.
"4"	The applicant has a good command of the material, participates in the discussion and solution of a situational clinical problem, demonstrates practical skills during the differential test of a sick child and the interpretation of clinical, laboratory and instrumental research data with some errors, expresses his opinion on the topic of the lesson, demonstrates clinical thinking.
"3"	The acquirer does not have sufficient knowledge of the material, is unsure of participating in the discussion and solution of the situational clinical problem, demonstrates practical skills during the differential test of a sick child and the interpretation of clinical, laboratory and instrumental research data with significant errors.
"2"	The acquirer does not possess the material, does not participate in the discussion and solution of the situational clinical problem, does not demonstrate practical skills during the differential test of a sick child and the interpretation of clinical, laboratory and instrumental research data.

The applicant is admitted to the differential credit on the condition that he meets the requirements of the educational program and if he received at least 3.00 points for the current educational activity. Differential assessment is carried out at the last lesson.

Structure of differential credit

Content of assessed activity	Quantity
Answer to theoretical questions.	2

Criteria for evaluating the results of students' learning on the differential credit:

"5"	Awarded to a student who worked systematically during the semester, showed versatile and deep knowledge of the program material during the differential test, is able to successfully complete the tasks provided for in the program, mastered the content of the main and additional literature, realized the relationship of individual sections of the discipline, their importance for the future profession, revealed creative abilities in understanding and using educational program material, demonstrated the ability to independently update and replenish knowledge; the level of competence is high (creative);
"4"	Awarded to a student who has demonstrated complete knowledge of the curriculum material, successfully completes the tasks prescribed by the program, mastered the basic literature recommended by the program, has shown a sufficient level of knowledge in the discipline and is capable of their independent updating and renewal during further education and professional activity ; level of competence – sufficient (constructive and variable)
"3"	Awarded to a student who has demonstrated knowledge of the main curriculum material to the extent necessary for further education and subsequent work in the profession, copes with the tasks provided for by the program, made individual errors in answers to differential assessment, but has the necessary knowledge to overcome the mistakes made under the guidance of a scientific and pedagogical worker; level of competence - average (reproductive)
"2"	presented to a student who did not demonstrate sufficient knowledge of the main educational and program material, made fundamental mistakes in the answers on the differential assessment, cannot use the knowledge in further studies without the help of the teacher, did not manage to master the skills of independent work ; level of competence – low (receptive-productive)

9. Distribution of points received by students of higher education

The grade for the discipline consists of 50% of the grade for the current academic performance and 50% of the grade that the student received on the differential test.

The average score for the discipline is translated into a national score and converted into points on a multi-point scale (200-point scale).

The conversion of a traditional grade into a 200-point grade is performed by the information and technical department of the University using the "Contingent" program according to the formula:

$$\text{Average success score (current success in the discipline)} \times 40$$

Table of conversion of a traditional grade into a multi-

grade National grade for a discipline	Sum of points for a discipline
Excellent ("5")	185 – 200
Good ("4")	151 – 184
Satisfactory ("3")	120 – 150
Unsatisfactory ("2")	Below 120

According to the *ECTS rating scale*, the achievements of students in the educational component studying in one course of one specialty are evaluated, respectively to the points obtained by them, by ranking, namely:

Conversion of the traditional grade from the discipline and the sum of points on the ECTS scale

Grade on the ECTS scale	Statistical indicator
A	Top 10% of scorers
B	Next 25% of scorers
C	Next 30% of scorers
D	Next 25% of scorers
E	Next 10% of applicants

10. Methodological support

- Work program of the academic discipline
- Syllabus of the academic discipline
- Methodical developments for practical classes
- Method practical recommendations for independent work of students of higher education
- Multimedia presentations

11. List of questions for differential assessment

1. Personal computer. PC hardware and software.
2. Information and its properties. Information measurement units.
3. Medical information and its types.
4. Subject and object of study of medical informatics. Tasks of medical informatics.
5. Computer information networks, types.
6. Basic network topologies.
7. Server and workstation.
8. Principles of building a global computer network INTERNET.
9. Programs - browsers, examples.
10. World Wide Web Web document. HTML format. Concept of URL.
11. Concept and purpose of search servers. Thematic search servers.
12. Database management systems.
13. Databases in medicine.
14. Ways to create a table structure.
15. Table data types. Properties of data and objects.
16. Classification of medical and biological data.
17. Classification systems.
18. Coding of medical and biological data.
19. Processing of medical and biological data using electronic spreadsheets.
20. Elements of probability theory.
21. Biosignal processing methods.

22. Types of signals.
23. Quantitative, qualitative and ordinal data.
24. Evaluation of parameters.
25. Hypothesis testing criteria.
26. Statistical functions of hypothesis testing.
27. Processing of medical images
28. Two- and three-dimensional images.
29. Transformation of images, types.
30. Basic principles of telemedicine.
31. Decision support systems.
32. Bases of medical knowledge.
33. Logical operations. Their properties.
34. Expressions and their characteristics.
35. Logical operations on statements.
36. A logical approach to the diagnosis of diseases.
37. The concept of algorithms and their properties.
38. Methods of describing algorithms. Types of algorithms.
39. Formalization of medical tasks.
40. Clinical decision-making systems. Types of systems.
41. Means of forecasting.
42. Formal models of the representation of knowledge (model of the product type of rules, model of the frame type, model of the network type).
43. Mechanisms of logical inference in the expert system.
44. Use of evidence in making medical decisions.
45. Clinical use of hospital information systems.
46. Technical support of hospital information systems (GIS).
47. Functions and applications of GIS.
48. Traditional and electronic medical records (EMK).
49. General structure of EMC.
50. Use of EMC data.
51. Characteristics and features of information resources of the health care system.
52. Administrative systems.
53. Medical information systems.
54. Use of information resources in evidence-based medicine.
55. Security of medical information systems (MIS).
56. Threats of MIS.
57. Problems of implementation of complex systems of protection of MIS.
58. Problems of the organization of protection of medicinal secrecy.

12. Recommended literature

Basic

1. Medical informatics: a textbook for medical university students / [O.I. Antyufeeva, I.A. Balyk, L.V. Batyuk, V.H. Kyzhavko]; under the editorship V. G. Kizhavka. / — Kharkiv: KhNMU, 2015. – 240 p.
2. Medical informatics: a study guide for students of medical universities / V. G. Kyzhavko, O. V. Zaitseva, M. A. Bondarenko, L. V. Batiuk, O. S. Rukin. - Kharkiv: KhNMU, 2019. - 65 p.
3. Medical informatics in modules: practicum: study guide (University of the IV year) / [Bulak I.E., Voitenko L.P., Mruga M.R. etc.]; under the editorship Bulakh I.E. — 2nd ed., ed. 2012.

4. Information technologies in psychology and medicine: textbook / I.E. Bulakh, I.I. Haimzon. - K.: VSV "Medicine", 2011. - 216 p.
5. Informatics and information technologies: workshop for org. work of students for practice. and laboratory. classes / Yu. Yu. Bilak, V. O. Laver, Yu. V. Andrashko, I. M. Lyakh; Ministry of Education and Science of Ukraine, State Higher Secondary School "Uzhhor. national Univ., Ft. inform. of technologies, Kaf. of computer science and physics and mathematics discipline - Uzhgorod: Outdoor-shark, 2015.
6. Informatics in tables and diagrams: PC and its components, Windows operating system, Internet, main and auxiliary devices, system and application software, modeling and programming / [Bilousova L. I., Olefirenko N. V.]. - Kharkiv: Torsing plus, 2014. - 111 p.
7. Topics, abbreviations and comments on the course of medical informatics (electronic teaching method manual). Godlevsky L.S., Mandel O.V., Marchenko S.V. etc.
8. The use of telemedicine technologies in the conduct of routine dental examinations (electronic study method manual) / L.S. Godlevskyi, O.V. Mandel, S.V. Marchenko. etc.
9. Standards of epidemiological studies. EPI INFO distributed database (learning method. Manual) / L.S. Godlevskyi, O.V. Mandel, A.I. Ponomarenko. etc.
10. Application of the LabVIEW virtual toolkit program in medical practice (electronic teaching method manual) / L.S. Godlevskyi, S.V. Marchenko, T.V. Pribolovets. etc.

Additional

1. Kolesnyk N.A., Fomina S.P. Theory and practice of evidence-based medicine. Kyiv: Polygraph Plus, 2017. 246 p.
2. Moskalenko V.F., Bulak I.E., Puzanova O.G.. Methodology of evidence-based medicine: textbook. K.: VSV "Medicine", 2014. 200 p.
3. Puzanova O. G., Gruzheva T. S. Information provision of evidence-based health care. Part I. // Proof. honey. 2014. No. 4 (16). P. 23-33.
4. Howick J. The Philosophy of Evidence-Based Medicine. Oxford : Blackwell-Wiley, 2011. 238.
5. Medical Informatics. Textbook for med. universities, institutes, acad. / Bulak I.E., Lyakh Yu.E. etc. — 4th edition. Recommended by the Ministry of Health, 2018
6. Health information management : concepts, principles, and practice / Pamela K Oachs, Amy Watters. Chicago, Illinois, American Health Information Management Association. 2021
7. Measuring Health Informatics In Bits and Bytes - A Competency Based Digital Approach / Saji Mathew Perinjelil. INDEPENDENTLY PUBLISHED, 2019. EAN: 9781796247657. ISBN:1796247650
8. Clinical Decision Support Systems: Theory and Practice - 3rd Edition/ Eta S. Berner (Ed.), MJBall. Springer International Publishing - Kindle Edition, 2016. ISBN-13: 978-1402048562. ISBN-10: 1402048564
9. Health Information: Management of a Strategic Resource / Mervat Abdelhak PhD RHIA FAHIMA, Sara Grostick MA RHIA FAHIMA, Mary Alice Hanken PhD CHPS RHIA, Ellen B. Jacobs MEd RRA. Saunders, 2015. ISBN 10: 1416030026 / ISBN 13: 9781416030027
10. Practitioner's Guide to Health Informatics / Mark L. Braunstein. Springer International Publishing, 2012. ISBN: 978-3-319-17661-1, Electronic ISBN: 978-3-319-17662-8.
11. Integration of Medical and Dental Care and Patient Data / Valerie Powell, Franklin M. Din, Amit Acharya, Miguel Humberto Torres-Urquidy. Springer International Publishing, 2012. ISBN: 978-1-4471-2184

Electronic information resources

1. www.cebm.net (Cochrane Center for Evidence-Based Medicine)

2. www.cochrane.org (Cochrane Library)
3. www.ncbi.nlm.nih.gov/PubMed (US National Library of Medicine)
4. www.cche.net (Canadian Center for Evidence-Based Health)
5. www.cdc.gov (Centers for Disease Control and Prevention)
6. www.bmj.com (British Medical Journal)
7. www.evidence-basedmedicine.com (Journal of Evidence-Based Medicine)