MINISTRY OF HEALTHCARE OF UKRAINE
POLTAVA STATE MEDICAL UNIVERSITY

Department of Physics

SYLLABUS

Medical Informatics

(title of the academic discipline)

selective discipline

(compulsory / selective discipline)

level of higher education	the second (master's) level of higher education
field of knowledge	22 «Healthcare»
specialty	222 «Medicine»
academic qualification	Master of Medicine
professional qualification	Doctor
academic and professional program	«Medicine»
mode of study	full-time
course(s) and semester(s) of study of the discipline	II course IV semester

Poltava – 2023 year

INFORMATION ABOUT LECTURERS WHO DELIVER THE ACADEMIC DISCIPLINE

Surname, name, patronymic of the lecturer (lecturers), scientific degree, academic title	Silkova Olena Viktorivna – Candidate of Pedagogic sciences, associate professor Lobach Natalia Vyacheslavivna – Candidate of Pedagogical sciences Makarenko Olexander Volodimirovich – Candidate of Pedagogical sciences Marusych Oksana Oleksandrivna
Profile of the lecturer (lecturers)	https://www.pdmu.edu.ua/fakultets/foreign-students/kafedry/med-inform/workers
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MAIN CHARACTERISTICS OF THE ACADEMIC DISCIPLINE

The scope of the academic discipline (module)
Number of credits / hours – **3,0 / 90**, of which:
Practical classes (hr.) – **30**
Self-directed work (hr.) – **60**
Type of control **Final module control**

The policy of the academic discipline

According to the Law of Ukraine «About the Higher Education», the applicant of higher education is obliged to comply with the requirements of the legislation, the statute and the rules of procedure for persons studying at the University. Follow the schedule of the educational process and the requirements of the curriculum. All participants of the educational process are required to attend lectures and practical classes, to take an active position in learning. In case of missed classes for two days in any form convenient for the recipients for higher education to inform the dean's office about the reasons that make it impossible to attend classes and perform other tasks provided by the curriculum.

At the first lesson of the course, recipients for higher educations are clearly informed about the forms of control measures and evaluation criteria, emphasizing the basic principles of labor protection during the relevant training. After the briefing, each recipients for higher education must sign the safety briefing journal.

During classes, recipients for higher educations are encouraged to keep a synopsis of the lesson and take an active part in discussing the issues. Applicants must be ready to understand the material in detail, ask questions, express their views, discuss. During the discussion is important: respect for colleagues; tolerance for others; susceptibility and impartiality; the ability to disagree with the opinion, but to respect the personality of the opponent; careful argumentation of the opinion; adherence to the ethics of academic relations; independent performance of tasks in the discipline.

Adhere to academic integrity and achieve learning outcomes defined for the appropriate level of higher education.

When organizing the educational process at PSMU, teachers and students of education act in accordance with the "Regulations on the Organization of the Educational Process at Poltava State Medical University" and other current regulatory documents https://www.pdmu.edu.ua/n-process/department-npr/normativni-dokumenti

Conducting the educational process in the discipline "Medical Informatics" in special conditions (martial law, quarantine during a pandemic, etc.) is carried out with the help of distance learning technologies, in particular, lectures and practical classes are conducted using the ZOOM platform, Google Meet, Google Classroom, etc.

Description of the academic discipline (summary)

«Medical Informatics» is an integrated interdisciplinary science that emerged at the intersection of computer science, computer technology and health care. This discipline covers the resources, databases, algorithms, and techniques needed to optimize the acquisition, storage, transmission, and use of health and biomedical information. The field of applications of medical informatics is multidisciplinary and covers such areas as electronic medical records of patients, decision support systems. eHealth, telemedicine, medical ethics, use of computer technologies in the public health system. This includes international health systems and global health information resources.

Recipients for higher educations will gain professional skills in searching and analyzing biomedical information, using innovative programs, resources and computer technology to improve health care, to develop science-based medicine and management in the field of medicine, to conduct their own research in the field of medical informatics. The competencies they have acquired will be needed to work in hospitals, research laboratories, diagnostic laboratories, insurance companies and government organizations.

The further development of medical informatics is connected with the solution of both global problems of the diseases widespread in the world, and improvement of efficiency and optimization of systems of rendering of medical services to the population in each country.

Pre-requisites and post-requisites of the academic discipline:

– It is based on the study by recipients for higher educations of academic disciplines: medical and biological physics, medical biology, morphological disciplines and integrates with these disciplines;

– It lays the foundations for the study of the disciplines of biostatistics and social medicine and the organization of health care; promotes recipients for higher educations' study of clinical, hygienic and social disciplines; involves the formation of skills to apply knowledge of medical informatics in the process of further training in professional activities.

The aim and tasks of the academic discipline:

the purpose of the discipline is: the formation and development of competencies aimed at the use of modern computer technology in medicine and health care, knowledge of methods of informatization of medical activities, automation of clinical trials, computerization of management in the health care system; ability to use modern software for general and special purposes in the processing of medical and biological data;

– the main tasks of studying the discipline are:

1) formation and development of knowledge, skills and abilities necessary for effective use of modern programs of general and special purpose in the field of health care;
2) acquainting recipients for higher educations with the importance and capabilities of new information and communication technologies in the field of health care, with the prospects for the development of computer technology;
3) development of the ability to independently master software for various purposes and update and integrate the acquired knowledge;
4) explanation of the principles of formalization and algorithmization of medical problems, the principles of modeling in biology and medicine;
5) formation of basic skills in working with PCs and searching for medical information using information technology;
6) use methods of medical and biological data processing.

Competences and learning outcomes in accordance with the academic and professional program, the formation of which is facilitated by the discipline

According to the requirements of the standard, the discipline «Medical Informatics» provides recipients for higher educations with the acquisition of ***competencies:***

*1) integral**:***

ability to solve complex specialized tasks and practical problems in professional activity in the field of health care in the specialty "Medicine", or in the learning process, which involves research and/or innovation and is characterized by complexity and uncertainty of conditions and requirements.

*2) general**:***

- ability to abstract thinking, analysis and synthesis, ability to learn and master modern knowledge;
- ability to apply knowledge in practical situations;
- knowledge and understanding of the subject area and understanding of professional activity;
- ability to adapt and act in a new situation;
- ability to make informed decisions; work in a team; interpersonal skills;
- skills of using information and communication technologies.

3) special (professional, subject)):

- ability to keep medical records

Learning outcomes of the academic discipline:

upon completing their study in the academic discipline, recipients for higher educations must

know:

– basic concepts of medical informatics;

– what is information, its main properties, features of collection, storage, retrieval,

– transformation, dissemination of information in medical and biological systems,

– features of application software for processing of medical and biological data and medical information;

– use of computer information systems in medicine and health care;

– basic approaches to the formalization and structuring of different types of medical data used to form decisions during the treatment and diagnostic process.

– types, structure, characteristics of medical information systems and means of personal data protection in medical information systems;

– algorithms and software tools to support decision-making during the treatment and diagnostic process.

be able to:

– demonstrate skills in using a database management system (DBMS) in the processing of medical and biological data;
– demonstrate basic skills to use Internet medical resources.
– apply statistical methods in processing the results of medical and biological research;
– demonstrate skills in using statistical functions and criteria for the analysis of biomedical data;
– analyze the principles of construction and operation of decision support systems in medicine;
– demonstrate the ability to present the conditions of medical and biological problems in a formal form;
– demonstrate the ability to use information resources to search for medical information.

Thematic plan of lectures (by modules), specifying the basic issues, which are considered at the lecture - lectures are not provided by the program.

Thematic plan of seminar classes by modules and content modules, specifying the basic issues, which are considered at the seminar class - seminars are not provided by the program.

Thematic plan of practical classes by modules and content modules, specifying the basic issues, which are considered at the practical class

Seq. No.	Title of the topic	Number of hours
Module 1. Fundamentals of information technology in the health care system. Processing and analysis of medical and biological data. *Content Module 1.* The computer in the doctor's activity. Methodology of information processing and analysis.		
1.	**Entrance control. Structure, content and tasks of medical informatics. The use of information technology in medicine.** - Subject, object, tasks of medical informatics.	2

	- The concept of information. Properties of information. - Medical data and their types, discrete and continuous data. - Use of computers and software for medical and biological data processing. - The concept of information technology, directions of development of information technology in medicine.	
2.	**Network technologies. The concept of information and telecommunication technologies, their impact on the development of medicine.** - Computer networks. World Wide Web. Search for specialized information on the Internet. - The essence and content of information and communication technologies in medicine. - Advantages and disadvantages of using information and communication technologies. - Fundamentals of telemedicine.	2
3.	**Computer data: data types, processing and management.** - Data management. Data storage. Types of models: hierarchical, relational and network model. - The concept of database (DB), database requirements, structuring. - Classification of databases: centralized database, distributed database, file server, client-server. - Information processing systems: user, data entry, user interface, data processing and presentation.	2
4.	**Database management systems and its basic functions. Working out and creation of medical database.** - Database management systems (DBMS). - Classification of database management systems. - Data structure. DBMS functions. - Stages of database development.	2
5.	**Coding and classification of medical data.** - The concept of classification and coding, thesaurus. - Types of codes: numerical, mnemonic, hierarchical, comparison codes. - Taxonomy, nosology, nosography. - International classification systems in medicine.	2
6.	**Visualization of medical and biological data. Processing and analysis of medical images.** - Radiological and non-radiological methods of obtaining medical images; analog, matrix images. - Methods of obtaining medical images: X-ray method, digital angiography, computed tomography, magnetic resonance imaging, ultrasound, scintigraphy, etc. - Basic principles of image processing.	2
7.	**Modern technologies of information processing and analysis by means of spreadsheets.**	2

	- Basic techniques of work in spreadsheets. - The simplest operations with spreadsheets: formating, formatting, filtering and sorting data. - Sorting and selecting data using filters. Introduction to statistical analysis. - Analysis and visualization of data using spreadsheets.	
8.	**Using the capabilities of spreadsheets for statistical processing of biomedical data.** - The main stages of medical and biological research, data preparation and presentation in tabular form. - Statistical methods of medical and biological data processing. - Use of statistical functions for data processing. - Analysis of statistics using charts and graphs.	2
Content Module 2. Medical knowledge and decision-making. Health information systems.		
9.	**Formalization and algorithmization of medical problems.** - Algorithmic model of medical knowledge presentation. - Drawing up a block diagram of a simple (linear) and branched algorithm. - Drawing up a block diagram of an algorithm with an internal cycle. - Stages of solving problems with the help of a computer.	2
10.	**Formal logic in solving problems of diagnosis, treatment and prevention of diseases.** - Fundamentals of logic of statements. Types (forms) of medical logic, advantages and disadvantages of different forms of medical logic. - Deterministic logic. - Logic of phase intervals. - Stages of the diagnostic process in probabilistic diagnosis.	2
11.	**Methods of support in taking decisions. Strategies for obtaining medical knowledge. Expert systems.** - Decision support systems. - Types of medical knowledge. Expert systems. - Stages of development of expert systems. - Knowledge base of the expert system. - Application of expert systems in medicine.	2
12.	**Modeling in biology and medicine.** - The concept of model, modeling. Types of models. - Properties of models. - Stages of mathematical modeling. - Examples of mathematical models.	2
13.	**Types of health information systems. Individual medical cards.** - Medical Information Systems (MIS): clinical use and technical implementation. - MIS architecture. Application of MIS. Examples of MIS. - Features of medical information systems in different areas of the health care system.	2
14.	**Fundamentals of evidence-based medicine. Information resources**	2

	of the health care system. - Basic concepts of evidence-based medicine. - Sources of available evidence in medicine. Features of search in international electronic medical databases. - The use of information resources in evidence-based medicine. - Problems of organization of protection of medical secrecy. - Problems of implementation of complex protection systems.	
15.	**Final module control.**	2
Total		**30**

Self-directed work

Seq. No.	Title of the topic	Number of hours
1.	Preparation for practical classes – theoretical training and development of practical skills	28
2.	Elaboration of topics that are not included in the classroom plan:	
1)	Measurement of information - Information hierarchy levels - Coding and decoding of information. - Information entropy and its properties.	3
2)	Methods of biostatistics - Data description. - Laws of distribution of discrete random variables. - Laws of distribution of continuous random variables. - Graphical method of presenting statistical data. - Verification of statistical hypotheses.	4
3)	Creation of database objects: forms, filters - General information about forms and their creation. - Using the Form Wizard. - Form development in Designer mode. - Substitution of data. - Applying a filter to view selected records in the database.	3
4)	Search and analysis of information using queries. Creating reports - Purpose and types of queries. - Calculated fields in queries. - Use of built-in functions. - Report as a database object. - Sequence of report creation.	3
5)	Algorithms, their properties. Types of algorithms - Concept of algorithm. - Basic properties of algorithms. - Ways of presenting algorithms. - Types of algorithms.	3
6)	Logic as a science. Logical operations, their properties. Construction of the truth table - Logical operators and expressions.	4

	- Algebra of logic. Binary number system and logic. - Basics of the logic of statements.	
7)	Methods and means of measurement and computer processing of biosignals - Types and characteristics of biosignals - Classification of biosignals - Computer processing of biosignals: parameters, areas of application and complications	3
8)	Ethical and legal principles in the health care system - Protection of medical information. - Problems of implementing complex protection systems. - Legal context regarding the protection of medical data. - Detection of threats and potential breaches of data security. - Challenges and prospects in improving the protection of medical information.	3
3.	Preparation for the final modular control	6
4.	Together	60

Individual tasks – are not provided by the program.

The list of questions that must be mastered by the recipients for higher education in the study of the discipline

1. Subject and object of study of medical informatics and mathematical statistics.
2. Information and its properties. Units of information. Medical information and its types.
3. Computer information networks, types. Basic network topologies.
4. Principles of building a global computer network INTERNET.
5. Programs - browsers, examples. World Wide Web. Web document. HTML format. The concept of URL.
6. Basic principles of telemedicine.
7. Database management systems. Databases in medicine.
8. Ways to create a table structure. Table data types. Data and object properties.
9. Classification of medical and biological data. Classification systems. Coding of medical and biological data.
10. Processing of medical and biological data using spreadsheets.
11. Methods of processing biosignals. Types of signals.
12. Medical image processing. Two- and three-dimensional images. Image transformation, types.
13. The concept of medical imaging.
14. Medical image as an object of medical informatics.
15. Methods of visualization of medical images.
16. Obtaining and processing medical images.
17. The main stages of visualization.
18. Quantitative, qualitative and ordinal data.
19. General and sample population. Formulation of statistical conclusion.
20. Discrete variation series. Forms of representation of a discrete variation series.

21. Interval variation series. Graphical representation of the interval variation series.
22. Correlation coefficient and its properties. Point estimation of correlation coefficient.
23. Logical operations, their properties.
24. Logical approach to disease diagnosis.
25. The concept of algorithms and their properties. Methods of description and types of algorithms.
26. Formalization of medical tasks.
27. Modeling and models of the health care system.
28. Types of medical knowledge.
29. Decision support systems.
30. Bases of medical knowledge.
31. Forecasting tools.
32. Clinical decision-making systems. Types of systems.
33. Formal models of knowledge representation (model of type of production rules, model of frame type, model of network type).
34. Functions and applications, clinical use and technical support of hospital information systems.
35. Traditional and electronic medical records (EMC). General structure and use of EMC data.
36. Characteristics and features of information resources of the health care system.
37. Administrative systems. Medical information systems, their security and threats.
38. Problems of implementation of complex MIS protection systems.
39. Use of evidence in medical decisions. Use of information resources in evidence-based medicine.
40. Problems of organization of protection of medical secrecy.

A list of practical skills for the final modular control.

Module 1. Basics of information technologies in medicine. Processing and analysis of medical and biological data.
1. Interpret the basic concepts of medical informatics.
2. Interpret the features of application software for processing medical data and medical information.
3. Analyze the role of information, communication and computer technologies in medicine.
4. Interpret the basic principles of telemedicine.
5. Demonstrate basic skills in using basic medical Internet resources
6. Interpret the principles of classification and coding of medical and biological information.
7. Interpret the principles of applying statistical methods when processing the results of medical and biological research.
8. Demonstrate skills in using statistical functions and criteria for the analysis of medical and biological data.
9. Interpret methods of processing and analysis of medical images.
10. Interpret the main formal models of presentation of medical knowledge.
11. Analyze the principles of construction and operation of decision support systems in medicine.

12. Interpret the basic concepts of expert systems.
13. Analyze trends in the development of knowledge systems.
14. Interpret the basic concepts of evidence-based medicine.
15. Analyze information sources for evidence-based medicine.
16. Demonstrate the ability to present the conditions of medical and biological problems in a formal form.
17. Interpret the use of evidence in medical decision-making.
18. Interpret the types of information systems in the field of health care.
19. Demonstrate skills in working with electronic medical records.
20. Demonstrate skills in working with medical information systems.
21. Demonstrate the ability to use information resources of evidence-based medicine to search for medical information.
22. Interpret ethical and legal principles of medical and biological information management.

The form of final control of academic performance – Final module control.

The system of continuous and final control

At each practical lesson the current control of knowledge according to the concrete purposes of a subject is carried out. Theoretical, practical training and individual recipients for higher education work as preparation for classroom classes are estimated at practical classes.

Assessment of success is integrated (all types of recipients for higher education work are evaluated both in preparation for the lesson and during the lesson) according to the criteria that are communicated to recipients for higher educations at the beginning of the study of the discipline.

Criteria for assessing knowledge of the discipline are determined according to the standardized generalized criteria for assessing the knowledge of higher education recipients for higher educations in PSMU (table 1). (https://www.pdmu.edu.ua/storage/department-npr/docs_links/NMQ6RVrpAGYuKpw1JoSJaApnMMMwbKdxQN9FC2hu.pdf)

Table 1

Standardized generalized criteria for assessing the knowledge of higher education recipients for higher educations in PSMU

For 4-point scale	Score in ECTS	Evaluation criteria
5 (excellent)	A	The recipients for higher education shows special creative abilities, is able to acquire knowledge independently, without the help of the teacher finds and processes the necessary information, is able to use the acquired knowledge and skills of decision-making in unusual situations, convincingly argues answers, independently reveals own talents and inclinations, possesses not less than 90 % of knowledge on the topic both during the survey and all types of control.

4 (well)	B	The recipients for higher education is fluent in the studied amount of material, applies it in practice, freely solves exercises and problems in standardized situations, independently corrects errors, the number of which is insignificant, has at least 85% knowledge of the topic as during the survey, and all types of control .
	C	The recipients for higher education is able to compare, summarize, systematize information under the guidance of a researcher, generally apply it in practice, monitor their own activities, correct errors, among which are significant, select arguments to confirm opinions, has at least 75% knowledge of topics both during the survey and all types of control.
3 (satisfactory)	D	The recipients for higher education reproduces a significant part of theoretical material, shows knowledge and understanding of the basic provisions with the help of a researcher can analyze educational material, correct errors, among which there are a significant number of significant, has at least 65% knowledge of the topic, and during the survey, and all types of control.
	E	The recipients for higher education has educational material at a level higher than the initial, a significant part of it is reproduced at the reproductive level, has at least 60% knowledge of the topic as during the survey, and all types of control.
2 (unsatisfactory)	FX	The recipients for higher education has the material at the level of individual fragments that make up a small part of the material, has less than 60% knowledge of the topic as at the time of the survey, and all types of control.
	F	The recipients for higher education has the material at the level of elementary recognition and reproduction of individual facts, elements, has less than 60% knowledge of the topic as during the survey, and all types of control.

Conversion of the current grade, given on a traditional 4-point scale, into a multi-point grade is not carried out at each lesson.

The conversion of a traditional 4-point scale into a multi-point grade (maximum 120 points) is carried out only after the current lesson, which precedes the final module control. The conversion is carried out according to the following algorithm:

- the average grade of a higher education student is calculated on a traditional 4-point scale, obtained during current classes belonging to this module (accurate to the hundredth of a point);

- the average score of the current success rate is calculated on the total number of classes in the module, and not on the actual number of classes attended by the student of higher education;

- to obtain the converted multi-point total evaluation of current success for the module, the calculated average evaluation for the module obtained according to the traditional 4-point scale is used, multiplied by a factor of 24. The exception is the case when the average evaluation according to the traditional 4-point scale is 2 points. In this case, the student of higher education receives 0 points on a multi-point scale, or to obtain a converted multi-point total evaluation of current success for the module, use *table 2*. The minimum converted sum of current success points for the module is 72 points.

Table 2.

Correspondence of the average score of the current performance on the traditional 4-point scale to the total score of the current performance for module

Average score for current academic performance (A)	Points for current success in the module (A * 24)	Points for PMK from the module (A*16)	Points for the module and/or exam (A*24 + A*16)	Category ECTS	On a 4-point scale
2	48	32	80	F FX	2 (unsatisfactory)
2,1	50	34	84		
2,15	52	34	86		
2,2	53	35	88		
2,25	54	36	90		
2,3	55	37	92		
2,35	56	38	94		
2,4	58	38	96		
2,45	59	39	98		
2,5	60	40	100		
2,55	61	41	102		
2,6	62	42	104		
2,65	64	42	106		
2,7	65	43	108		
2,75	66	44	110		
2,8	67	45	112		
2,85	68	46	114		
2,9	70	46	116		
2,95	71	47	118		
3	72	50	122	E	3 (satisfactory)
3,05	73	50	123		
3,1	74	50	124		
3,15	76	50	126		
3,2	77	51	128		
3,25	78	52	130	D	
3,3	79	53	132		
3,35	80	54	134		
3,4	82	54	136		
3,45	83	55	138		

3,5	84	56	140	C	4 (well)
3,55	85	57	142		
3,6	86	58	144		
3,65	88	58	146		
3,7	89	59	148		
3,75	90	60	150		
3,8	91	61	152		
3,85	92	62	154		
3,9	94	62	156		
3,95	95	63	158		
4	96	64	160	B	
4,05	97	65	162		
4,1	98	66	164		
4,15	100	66	166		
4,2	101	67	168		
4,25	102	68	170		
4,3	103	69	172		
4,35	104	70	174		
4,4	106	70	176		
4,45	107	71	178		
4,5	108	72	180	A	5 (excellent)
4,55	109	73	182		
4,6	110	74	184		
4,65	112	74	186		
4,7	113	75	188		
4,75	114	76	190		
4,8	115	77	192		
4,85	116	78	194		
4,9	118	78	196		
4,95	119	79	198		
5	120	80	200		

The final control of the learning of the module takes place after completing the study of the block of relevant content modules by testing and performing practical tasks.

Students of higher education who have attended all practical classes (or completed missed classes in the established order), fulfilled all the requirements of the curriculum and scored a converted sum of points not less than the minimum - 72 points are admitted to the final modular control. If, according to the results of the current academic performance, the applicant of higher education scored 72 points, he is allowed to take the Final modular control.

The presence of a grade of "2" for the current academic performance does not deprive the student of higher education of the right to admission to the final module control with the minimum permissible number of points for the current academic performance.

A student of higher education does not have the right to change the current grades of "2" if he has the minimum number of points for admission to control measures. Current grades of "3" or "4" do not roll over. The student of higher education is obliged

to rewrite "2" if the current average score for the module does not reach the minimum (3.0 points). Permission to work on the current grade "2" is granted by the head of the department only for the purpose of the higher education applicant achieving the minimum number of points for admission to the final examination.

Applicants of higher education who, during the study of the module from which the final control is conducted, had an average current success score of 4.50 to 5.0 are exempted from taking the Final modular control and automatically (upon consent) receive a final grade in accordance with Table 2, while the presence of the applicant education at Final modular control is mandatory. In case of disagreement with the assessment, the specified category of higher education applicants makes the Final modular control according to general rules

Assessment of knowledge during Final modular control takes place in two stages.

The first passing the test control, which contains only theoretical questions according to the discipline program. The total number of questions in the test control is 25 items. For each question, the student can get 2 points. If the number of points received by the student for the test control is more than 20 points, then the test is considered to have been passed successfully. Otherwise, the test is considered not passed and an overall unsatisfactory grade for the Final modular control is given, which is equal to the number of points for correct answers.

The next stage is solving typical tasks. For the comprehensive solution of which the student can get a maximum of 30 points.

So, in case of successful passing of the test, the total score for Final modular control is calculated according to the scheme:

The overall assessment of Final modular control is issued in accordance with the following provisions.

Final modular control = points for test control + assessment for tasks

71-80 points are awarded to a student who completed the test tasks and demonstrated comprehensive, systematic and deep knowledge, the ability to independently perform the tasks provided for by the program, familiarized with the basic and additional literature recommended by the program. The knowledge of the learner is solid, generalized; the student of education knows how to apply knowledge creatively, his educational activity is characterized by the ability to independently evaluate various situations, phenomena, facts, identify and defend a personal position.

61-70 points are awarded to a student who completed the test tasks and mastered the curriculum material in full, successfully completed the tasks provided by the program, and studied the basic literature recommended by the program. That is, the student of education knows the essential signs of concepts, phenomena, regularities, connections between them, and also independently applies knowledge in standard situations, possesses mental operations, knows how to draw conclusions, correct mistakes. The answer is complete, correct, logical, justified.

50-60 points are awarded to a learner who completed the test tasks and demonstrated knowledge of the basic educational material in the amount necessary for further education and future work in the profession, is able to perform elementary tasks according to the sample provided by the program, is familiar with the basic literature

recommended by the program. As a rule, the answer of the student of education when reproducing the educational material is concise, determined by the initial ideas about the subject of study. The learner reproduces the basic educational material and possesses elementary skills of educational activities.

0-49 points are awarded to a learner who has not completed the test tasks and whose knowledge has gaps, who has made fundamental mistakes in completing the tasks provided by the program, that is, a learner who is unable to describe phenomena, does not demonstrate knowledge and understanding of the main provisions of the topic.

In the event that a student of higher education violates the rules of academic integrity of the evaluation results obtained during the preparation of the PMK, the student's answer is given an "unsatisfactory" grade.

The result of the final module control is evaluated in points (the traditional 4-point evaluation is not assigned). The maximum number of points of the final modular control is 80 points. The minimum number of points of the final module control, at which the control is considered passed, is 50 points. The maximum number of points for the module is 200 points (of which up to 120 points are for current success).

Teaching methods

The study of the discipline "Medical Informatics" is implemented on the basis of methods of productive learning, in particular, problem-based presentation, heuristic, research, interactive (project method, simulation of professional situations, role-playing and business games). In this case, reproductive methods should be used at the initial stage of training, as they are focused on the ability to reproduce the acquired knowledge to solve typical problems through the use of algorithms, instructions, guidelines. Peculiarities of productive learning methods are to create conditions for activating thinking, increasing the motivation of higher education recipients for higher educations, making creative decisions, sustained activity during the tasks.

Assessment forms and methods

The current evaluation of education seekers for practical classes is carried out in the form of an oral survey, solving situational tasks, written control, written or software computer testing (in accordance with the Regulation on the organization of the educational process at PSMU (clause 6 Evaluation of learning results)).

Final control is carried out in the form of modular control.

Methodological support

1. Thematic plans of lectures and practical classes.
2. Recommended literature.
3. Materials for monitoring the knowledge, abilities and skills of education seekers: tests of different levels of complexity; situational tasks; computer control programs.
4. A list of questions that a student of higher education must learn when studying an academic discipline.

Recommended reading

Basic (available at the library of PSMU)

1. Medical informatics : textbook [for students of higher medical education establishments of the 4th level of accreditation] / I.Y. Bulakh, Y.Y. Liakh, V.P. Martseniuk, I.Y. Khaimzon. – 2th. ed., correc. – K. : Medicine Publishing, 2016. – 367 p.
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