Ministry of Healthcare of Ukraine
Poltava State Medical University

Department of medical informatics and medical and biological 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	Medical Doctor
academic and professional program	«Medicine»
mode of study	full-time
course(s) and semester(s) of study of the discipline	II course III-IV semester

Poltava – 2021 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
Contact phone	(0532) 68-73-86
E-mail:	med_informatic@pdmu.edu.ua
Department page at the website of PSMU	https://www.pdmu.edu.ua/fakultets/foreign-students/kafedry/med-inform

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 **Total modular 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 the code of academic integrity when creating projects, preparing essays, reports and answers in the class. In case of borrowing ideas, statements and educational information, it is correct to draw up the link, following the rules of citation.

When organizing the educational process in PSMU teachers and recipients for higher educations act in accordance with:

Regulations on the organization of the educational process in the Poltava State Medical University.

Provisions about organizing the initial process.

The Code of Academic Integrity.

Internal rules for recipients for higher educations of the Poltava State Medical University.

Documents are situated on the site: (https://www.pdmu.edu.ua/n-process/department-npr/normativni-dokumenti)

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. - The concept of information. Properties of information.	2

	- 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. - Basic techniques of work in spreadsheets.	2

	- 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 (EU). - 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. Health Resource Information Resources. Credit Test. - 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.	2
15.	**Total modular 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	40
2.	Preparation for the final modular control	5
3.	Elaboration of topics that are not included in the classroom plan	15

Individual tasks – are not provided by the program.

The list of theoretical questions for recipients for higher education' preparation for the final module control and semester final attestation

Module 1. Fundamentals of information technology in the health care system. Processing and analysis of medical and biological data.

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, its types.
13. The concept of medical imaging.
14. Medical image as an object of medical informatics.
15. Methods of visualization of medical images.
16. Receipt and processing of 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. A logical approach to the diagnosis of diseases.
25. The concept of algorithms and their properties. Methods of description and types of algorithms.
26. Formalization of medical tasks.
27. Health system modeling and models.
28. Types of medical knowledge.
29. Decision support systems.
30. Medical knowledge base.
31. Forecasting tools.
32. Medical decision-making systems. Types of systems.
33. Formal models of knowledge representation (model of production rules type, frame type model, network type model).
34. Functions and applications, clinical use and technical support of hospital information systems.
35. Traditional and electronic medical cards (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 making medical decisions. Use of information resources in evidence-based medicine.
40. Problems of organization of protection of medical secrecy.

The list of practical skills required for the final module control and semester final assessment

Module 1. Fundamentals of information technology in the health care system. Processing and analysis of medical and biological data.

1. Interpret the basic concepts of medical informatics.
2. Interpret the features of the application of application software for processing medical data and medical information.
3. Analyze the role of information, communication and computer technology in medicine.
4. Interpret the basic principles of telemedicine.
5. Demonstrate basic skills to use basic medical resources on the Internet
6. Interpret the principles of classification and coding of medical and biological information.
7. Interpret the principles of application of statistical methods in processing the results of medical and biological research.

8. Demonstrate skills in using statistical functions and criteria for the analysis of biomedical data.
9. Interpret methods of processing and analysis of medical images.
10. Interpret the basic formal models of medical knowledge presentation.
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 sources of information 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 making medical decisions.
18. Interpret the types of health information systems.
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 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 – Total modular 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 ISW (individual student work) as preparation for classroom classes are estimated at practical classes.

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

Criteria for assessing recipients for higher education knowledge of the discipline are determined according to the standardized generalized criteria for assessing the knowledge of higher education recipients for higher education in PSMU (table 1).

Table 1

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

For 4-point scale	Score in ECTS	Evaluation criteria
5 (excellent)	A	The recipient 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 recipient 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 recipient 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 recipient 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 recipient 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 recipient 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 recipient 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, set on the traditional 4-point scale, to multi-point in each lesson is not carried out.

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

– calculates the average student's grade on the traditional 4-point scale, obtained during the current classes belonging to this module (to the nearest hundredth 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 recipients for higher education attended;

– To obtain a convertible multi-point total score of the current Module performance, the calculated average score for Module obtained on the traditional 4-point scale multiplied by a factor of 24 is used. The exception is when the average score on the traditional 4-point scale is 2 points. In this case, the student receives 0 points on a multi-point scale, or to obtain a convertible multi-point total score of the current performance of the Module using table 2.

Minimum convertible sum of points of current success for all modules **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

The average score of the current performance on the traditional 4-point scale	Points for current performance after converting the average score
2	48
2,1	50
2,15	52
2,2	53
2,25	54
2,3	55
2,35	56
2,4	58
2,45	59
2,5	60
2,55	61
2,6	62
2,65	64
2,7	65
2,75	66
2,8	67
2,85	68
2,9	70
2,95	71
3	**72**
3,05	73
3,1	74
3,15	76
3,2	77
3,25	78

3,3	79
3,35	80
3,4	82
3,45	83
3,5	84
3,55	85
3,6	86
3,65	88
3,7	89
3,75	90
3,8	91
3,85	92
3,9	94
3,95	95
4	96
4,05	97
4,1	98
4,15	100
4,2	101
4,25	102
4,3	103
4,35	104
4,4	106
4,45	107
4,5	108
4,55	109
4,6	110
4,65	112
4,7	113
4,75	114
4,8	115
4,85	116
4,9	118
4,95	119
5	120

The total modular control takes place upon completion of the study of the block of relevant content modules by testing and performing practical tasks.

Recipients for higher education who have attended practical classes (or completed missed classes in the prescribed manner), fulfilled all the requirements of the curriculum and scored a convertible amount of points not less than the minimum - 72 points are allowed to the final module control. If the student has scored 72 points according to the results of the current success, he can take the TMC.

The presence of a grade of "2" for current performance does not deprive the student of the right to be admitted to the Total Module control with a minimum number of points for current performance.

The recipient for higher education is not entitled to retake the current grades "2" if he has the minimum amount of points for admission to control measures. Current scores of "3" or "4" do not add up. The recipient for higher education is required to retake "2" if the average score of the current success rate for the module does not reach the minimum (3.0 points). Permission to practice the current grade "2" is granted by the head of the department only in order for the student to achieve the minimum number of points for admission to the final control.

Recipients for higher education who have an average grade point average of 4.5 to 5.0 during their studies in medical informatics are exempted from compiling the PMC and automatically (with consent) receive a final grade in accordance with Table 3.

Table 3

Criteria for compliance of the average score of the current performance with the results of the TMC

Average score of current performance	Compliance with TMC scores
4,5	72
4,55	73
4,6	74
4,65	74
4,7	75
4,75	76
4,8	77
4,85	78
4,9	78
4,95	79
5	80

Assessment of knowledge during the TMC takes place in two stages.

The first - passing a test control, which contains only theoretical questions in accordance with the program of the discipline. The total number of questions in the test control is - 25 question. 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, the test is considered passed. Otherwise, the test is considered failed and a general unsatisfactory score is given for TMC, which is equal to the number of points of correct answers.

The next stage is to solve typical problems. For a comprehensive solution of which the student can receive a maximum of 30 points.

Therefore, in case of successful passing of the test the total estimation on TMC is made according to the scheme:

The overall assessment of the TMC is set in accordance with the following provisions.

TMC= scores for test control + score for the task

71-80 points are awarded to a recipient for higher education who has completed the test tasks and has shown comprehensive, systematic and deep knowledge, the ability to independently perform the tasks provided by the program, acquainted with the main and additional literature recommended by the program. The recipient for higher education knowledge is strong, generalized; the recipient for higher education is able to apply knowledge creatively, his educational activity is marked by the ability to independently assess various situations, phenomena, facts, to identify and defend a personal position.

61-70 points are awarded to a recipient for higher education who has completed test tasks and mastered the curriculum in full, successfully completes the tasks provided by the program, worked out the basic literature recommended by the program. That is, the recipient for higher education knows the essential features of concepts, phenomena, patterns, relationships between them, as well as independently applies knowledge in standard situations, has mental operations, is able to draw conclusions, correct mistakes. The answer is complete, correct, logical, reasonable.

50-60 points are awarded to a recipient for higher education who has completed test tasks and knowledge of basic educational material in the amount necessary for further study and future work in the profession, able to perform basic tasks on the model provided by the program, familiar with the basic literature recommended by the program. As a rule, the recipient's for higher education response to the reproduction of educational material is concise, due to the initial ideas about the subject of study. The recipient for higher education reproduces the basic educational material and has basic skills of educational activity.

0-49 points are awarded to a recipient for higher education who did not complete the test tasks and whose knowledge has gaps, who made fundamental mistakes in performing the tasks provided by the program, ie a recipient for higher education who is unable to describe the phenomena, does not show knowledge and understanding of the main topics.

The result of the final Modular control is evaluated in points (traditional 4-point evaluation is not given). The maximum number of points of the final Modular control is 80 points. The minimum number of points of the final Modular control, for which the control is considered to be completed, is 50 points. **The maximum number of points for the Module is 200 points.**

The grade in the discipline is set by the department on the traditional (national) 4-point scale based on the average number of points for the two modules provided by the program of the discipline.

The scale of translation of the average number of points for the modules provided by the program in the discipline, in the traditional assessment on a 4-point scale of disciplines is presented in table 4.

Table 4

Conversion of the average number of points for all modules provided by the program in the discipline, in the traditional assessment on a 4-point scale

The average number of points for all modules of the discipline	Traditional score on a 4-point scale
122 – 138	3
140 – 178	4
180 – 200	5

The grade from the discipline is given only if the recipient for higher education has all the enrolled modules.

Teaching methods

The studying of the discipline "Medical Informatics" is guilty of realizing on the basis of methods of productive education, spawn, problematic wikklad, heuristic, pre-adolescent, interactive (method of projects, modeling of professional situations and roles). With a wide range of reproductive methods of guilt, the vicarists are found on the cob stage of development, the odds of the stench are given on the occasion of the creation of the knowledge that the typical establishment of the school of victorious algorithms. The peculiarities of the methods of productive education are among the mainstream of the minds of the activization of the mission, the promotion of the motivation of the recipients for higher education, the acceptance of creative solutions, the style of activity by extension.

Control methods

Oral control, written control, test control, self-control, practical check, final control is carried out in the form of modular control (TMC).

Methodological support

1. Working curriculum
2. Methodical instructions for independent work of recipients for higher education during preparation for a practical lesson and in class
3. List of recommended reading
4. Materials for control of knowledge, skills and abilities of recipients for higher education:
- tests of different levels of difficulty
- situational tasks
- computer control programs
5. Multimedia presentations

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.
2. Korovina L.D. Medical Informatics: A primary tutorial for students of other medical primary mortgages / L. D. Korovina – Poltava: UMSA, 2008. – 144 p.
3. Marzeniuk, V.P. Biophysics and medical informatics : Manual for Students of the Higher Medical Schools of the III–IV Degree of Accreditation / V.P. Marzeniuk, V.D. Didukh, D.V. Vakulenko at al. – Ternopil : Ukrmedknyha, 2004. Vol. 1: – 479 c.
4. Medical informatics : tutorial guide / S. Yu. Olenets ; Ministry of health of Ukraine, UMSA (Poltava), Department of medical informatics, medical and biological physics = Медична інформатика : навчальний посібник / С. Ю. Оленець ; МОЗ України, УМСА, Кафедра інформатики, медичної та біологічної фізики. – Poltava : РВВ УМСА, 2017. – 159 p.

Supplementary

1. Sullivan F., Wyatt J. ABC of Health Informatics / BMJ Books, 2009. - 56 pp.
2. Lazakidou A.A., Siassiakos K.M. Handbook of Research on Informatics in Healthcare and Biomedicine. - Idea Group Publishing, 2006. - 569 pp.
3. Medical Informatics: Knowledge Management and Data Mining in Biomedicine / Editors H. Chen, S.S. Fuller, C. Friedman, W. Hersh. - Springer Science+Business Media, Inc., 2005. - 647 pp.
4. Mathews A. Usability Evaluation of Laboratory Information Systems / A. Mathews, D. Marc // J Pathol Inform. - 2017. - 8:40.

Information resources

1. www.imia.org (International Association of Medical Informatics)
2. www.mihandbook.stanford.edu (Medical Informatics, Stanford University)
3. www.uacm.kharkov.ua (Ukrainian Association of Computer Medicine)
4. www.mednavigator.net (Medical search engine)

Developers Silkova Olena Viktorivna – PhD, associate professor
Lobach Natalia Vyacheslavivna – PhD
Marusych Oksana Oleksandrivna