

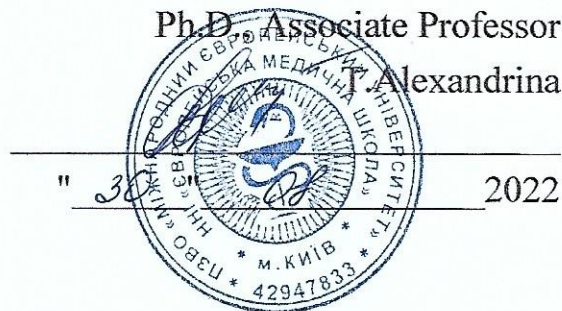
**INTERNATIONAL EUROPEAN UNIVERSITY
EDUCATIONAL AND SCIENTIFIC INSTITUTE
"EUROPEAN MEDICAL SCHOOL"**

APPROVED

Director of ESI"EMS"

Ph.D. Associate Professor

Alexandrina




**COURSE TRAINING PROGRAM
on
MEDICAL INFORMATICS**

Degree level	Master
Field of study	22 "Health care"
Specialty	222 "Medicine"

Kyiv - 2022

DEVELOPED AND SUBMITTED: Educational and Scientific Institute "European Medical School", Department of Fundamental and Medical and Preventive Disciplines.

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Discussed and approved by the Department of Fundamental and Medical Preventive Disciplines №.1 from " 25 " 08 2022
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Approved at the meeting of the Scientific Council of the ESI"EMS"
№ 1 of " 29 " 08 of 2022

INTRODUCTION

Program study educational disciplines "MEDICAL COMPUTER SCIENCE" composed for second-year students in accordance with the Higher Standard education of Ukraine (further – Standard) the second (master's) equal industry of knowledge 22

"Health care", specialty 222 "Medicine", educational qualifications Master medicine, professional qualifications "Doctor".

Description educational disciplines (annotation): Educational discipline "Medical Computer Science " is taught with purpose familiarization students from using modern information and communication technologies in industry protection health, what allows medical employees carry out analysis morbidity, driving medical documentation, processing of medical and social information using provisions and principles proof medicine, and from using modern computer information technologies. **Medical informatics** is applied, practical science that studies patterns and methods of obtaining, storing, and processing and the use of knowledge in medical science and practice for the purpose of expanding opportunities knowledge, prevention and treatment of diseases, protection and improvement of health a person Medical Computer Science works with medical information WITH computer science is transferred general concepts of information and its properties.

By types educational classes according to with educational plan is practical occupation and independent work students

Informative description primary disciplines

Name indicators	Field of knowledge, direction training, educational - qualifying level	Characteristic educational disciplines
		daytime form teaching
Number loans – 3	Branch of knowledge 22 "HEALTH PROTECTION"	Normative
	Direction preparation "Medicine"	
Sections –	Specialty: 222 "Medicine"	Year preparation:
Content sections –		2nd
the total number of hours - 90		3rd semester
Weekly workload: Auditory - 3 hours	Educational qualification level: "Master of Medicine" qualifications professional "doctor"	Practical
		48 hours
		Independent work 42 hours
		Type of control:
		Diff . credit .

The subject of study of the educational discipline "Medical informatics" is information and informative processes, are related with medical and biological, clinical and preventive problems in medicine. It is oriented towards biomedicine - an approach to health on individual, group and population levels with purpose solution practical tasks Object study medical computer science - system

health care, the leading part of which is health care and system elements for levels management and organizations in medicine.

Interdisciplinary connections :

Medical Computer Science as educational discipline:

- integrates with such disciplines as medical biology, medical chemistry, biological chemistry, histology, physiology, radiology, hygiene and ecology epidemiology, medical statistics, fundamental and clinical disciplines;
- lays down foundations study students biostatistics and social medicine, organizations protection health, ecology and epidemiology, medical statistics, special professional discipline

1. GOAL AND EDUCATIONAL TASKS DISCIPLINES "MEDICAL COMPUTER SCIENCE"

1.1. The purpose of teaching the educational discipline "Medical Informatics" is formation theoretical knowledge, practical skills and skills of working with a personal computer and diverse applied programs, which necessary for effective using modern software and technical means computerization in educational process, scientific and professional activity, familiarization with the latest information technologies and the possibilities of their application in professional activities, which allows optimize information processes.

1.2 The main tasks of study discipline "Medical informatics" according to requirements educational and professional programs regarding of knowledge and skill students are:

- formation systems of knowledge in students about essence information and medical information, computer science and informative processes in medicine;
- formation ability and skill to solve typical and complex specialized tasks, practical problems in professional activity in industry protection health, what relate to application personal computer and work with programs general appointment;
- formation of a system of knowledge and skills for conducting research and/or implementation innovations in medicine from using modern approaches which characterized by complexity and uncertainty requirements from using settlement and analytical methods;
- provide information about modern information technologies in general and in medicine; to study principles storage, search, processing and analysis medical and biological information by with the help of computer technologies that and is an integral part of professional competence of a future specialist in the field of health care, as well as the basis for study of professionally oriented natural and clinical disciplines at higher medical schools educational institutions of Ukraine.

Achievement specified goals and implementation relevant to goals tasks will allow students – doctors master knowledge and skills in region informative technologies, what are used in medicine, which necessary for direct formation of a doctor and researcher - a professional in his field, as well as for study other academic theoretical and clinical disciplines in higher medical schools institutions

1.3 Competences and learning outcomes, the formation of which contributes to the discipline. According to with requirements standard discipline "Medical Computer Science" provides acquisition students **competencies** :

- **integral:** the ability to integrate knowledge and solve complex specialized problems tasks in the broad and multidisciplinary contexts of a doctor's professional activity, solve practical problems in new or unfamiliar environments when available incomplete or limited information, with taking into account aspects social and ethical responsibility in the industry Health Care;
- **general and professional:**

general competence (ZK)	
ZK 1.	Ability to abstract thinking, analysis and synthesis.
ZK 2.	Ability to learn and master modern knowledge.
ZK 3.	Ability to apply knowledge in practical situations.
ZK 4.	Knowledge and understanding of the subject area and understanding of professional activity
ZK 5.	Ability to adapt and act in a new situation
ZK 6.	Ability to make informed decisions
ZK 7.	Ability to work in a team
ZK 8.	Ability to interpersonal interaction
ZK 10.	Ability to use information and communication technologies
ZK 11.	Ability to search, process and analyze information from
ZK 12.	Determination and persistence of delivered tasks and taken responsibilities
Professionals competencies (FC)	
FC 1	Ability collect medical information about the patient and analyze clinical data
FC 16	Driving ability _ medical documentation , including electronic forms.
FC 23	Ability develop and implement scientific and applied projects in the field protection health _
FC 25	Compliance professional and academic integrity , to be responsible for reliability received scientific results
Software the results teaching (PRN)	
PRN 1.	Have thorough knowledge of the structure of professional activity. Be able to carry out professional activities that require updating and integration of knowledge. To be responsible for professional development, the ability for further professional training with a high level of autonomy
PRN 2	Understanding and knowledge of basic and clinical biomedical sciences, on level sufficient for solving professional tasks in the field of health care
PRN 21	Search for the necessary information in professional literature and databases data from other sources, analyze, evaluate and apply this information
PRN 22	Apply modern digital technologies, specialized software provision, statistical methods of data analysis for solving complex health care problems.

Integrative final program learning result, the formation of which helps educational discipline "Medical Computer Science" is formation professional competencies, ability to solve typical and complex specialized tasks and practical problems in professional activity in industry protection health, by using modern software software for modeling problem situations on basis systemic analysis of the complex factors on basis principles proof of medicine and conditions defined and undefined nature including with their analytical assessment, namely:

- formation in students holistic systems using modern of knowledge informative technologies, what forms in students ability effectively use modern programs of general and special purpose in the field Health Care;
- knowledge modern approaches in use software means different appointment and the ability to independently update and integrate acquired knowledge;
- knowledge principles proof medicine, skill their practical application;
- knowledge of the mechanisms of influence of physical factors of the environment on the body human ability to assessment their importance from using modern software software;
- knowledge physical principles, what lie down in basis diagnostic, medical and preventive methods of medicine;
- to be able to classify types and methods of medical information processing; know and understand principles coding medical information; be able draw up list and describe methods, which ones unprocessed data they can to be processed to important information; know

- principles of biomedical coding information
- knowledge of the physical and technical principles of medical diagnostic equipment, medical and medical and preventive purposes;
- knowledge modern methods mathematical modeling and statistical processing medical and biological information and their skills use on practice;
- skill independently master software means different appointment and update and integrate acquired knowledge;
- skill evaluate role new ones information and communication technologies in industry protection health with prospects for the development of computer techniques

2. INFORMATIVE AMOUNT EDUCATIONAL DISCIPLINES

On study educational disciplines is assigned **90** hours (**3.0** loans ECTS, **48** hours practical classes and **42** hour independent work

The course program is structured into sections, which include **2** substantive sections:

Contentful section 1. Basics informative technologies in industry protection health. Processing and analysis of medical and biological data.

Contentful section 2. Medical data. Methodology processing and analysis medical information

SUBSTANTIAL SECTION 1. BASICS OF INFORMATION TECHNOLOGIES IN THE INDUSTRY GUARDS HEALTH

Topic 1. Basic concept disciplines "Medical Computer Science".

Basic concept disciplines "Medical Computer Science".

The history of the formation of medical informatics and the prospects of its development in the context experience informatization society. Transfer information Network technologies. Computer data: types data, processing and management of data arrays.

Topic 2. Coding and classification medical data.

Concept classification.. Concept props, classifiers. Hierarchical system classification. Faceted system classification. Descriptive system classification Classification coding. Bar coding. International classification systems in medicine

Topic 3. Analysis biosignals. Visualization medical and biological data

Biosignals: registration, conversion and classification of signals. Acquisition and analysis biosignals. Digital methods of biosignal processing.

Topic 4. Processing and analysis medical images.

Types medical images and their characteristics. Methods receiving medical images. Digital processing of medical images. Software for processing and analysis images.

Topic 5. Foundations statistical analysis medical and biological data

Modern technologies analysis data Sorting medical and biological data Work with filters. Random variables. Laws of distribution of random variables. Statistical analysis data Elements of selective theories.

Topic 6. Audit statistical hypothesis Correlative analysis.

Planning experiment Formulation hypothesis Statistical criteria. Rating statistical parameters and audit hypothesis Correlative analysis.

Topic 7. Foundations telemedicine

Subject and basic concepts of telemedicine. History of telemedicine. Organizational chart connection of the access node and medical institutions. Organizational chart communication regional access node and regional medical institution. Scheme of organization of access node communication and control center. Structural diagram of the Telemedicine Network of the Regional Center. Typical sets telemedicine equipment. Telemedicine technologies in work centers ultrasonic diagnostics radio modem line connection Prospects application telemedicine technologies. Centers rehabilitation

Topic 8. Application of telecommunication technologies in medicine. Telemedicine _ chain of the regional center".

Consultation telemedicine complexes, operational telemedicine hardware and software complexes, mobile telemedical complexes and systems, preventive maintenance population, service remote subjects. Scheme organizations connection node access and control center. Structural diagram of the Telemedicine Network of the Oblast center". Typical sets of telemedicine equipment.

**SUBSTANTIAL SECTION 2.
METHODOLOGY PROCESSING AND ANALYSIS MEDICAL
INFORMATION**

Topic 9. Network systems diagnostics.

Rules for using the diagnostic system. Comparison of online systems diagnostics. Diagnos.ru - system. Diagnostics diseases Algorithmization and mathematical simulation of telemedical procedures, consultations, provision of emergency care. **Topic 10. Formal logic in solutions tasks diagnostics, treatment and prevention diseases**

Deterministic logic, logic phase interval, informational and probabilistic logic, diagnostic algorithm, informational and probabilistic logic

Topic 11. Methods support adoption solutions Strategies receiving medical of knowledge

Definition of the expert system and its main functions, classification and application experts systems in medicine; knowledge base for expert systems

Topic 12. Means of forecasting. Clinical decision support systems. Definition and architecture systems knowledge, procedural knowledge, declarative knowledge, expert systems in medicine, artificial intelligence.

Topic thirteen. Modeling systems support adoption solutions

Formal model medical expert systems, conceptual model medical expert systems, tree solutions systems support medical solutions structure systems supporting the adoption of medical treatment solutions

Topic 14. Types of information systems in industry protection health.

Main aspects of informatization of medical activity, general technological scheme diagnostically - medical process, stages creation and the main ones characteristics MIS, classification of medical information systems, medical information systems basic equal.

Topic 15. Medical information systems of the medical and preventive level institution Public health and health care.

MISS consultative centers, screening systems, features organizations medical information environment preventive institution, MIS territorial and state level, Information support of MIS. Hospitals informative systems: clinical using and technical realization, history development, functions, architecture, application, examples.

**3. STRUCTURE EDUCATIONAL DISCIPLINES
"MEDICAL COMPUTER SCIENCE"**

Names content sections and topic s	Number hours					
	daytime form					
	ever yth ing oh	in ago number of				
1	l.	p.	Lab	Indi an _	with . p.	
1	2	3	4	5	6	7
Contentful section 1. Basics information technologies in protection industry health.						

Topic 1. Basic concepts of the discipline "Medical Computer Science"	5		3			2
Topic 2. Coding and classification medical data	5		3			2
Topic 3. Analysis of biosignals. Visualization of medical biological data	5		3			2
Topic 4. Processing and analysis medical images.	5		3			2
Topic 5. Fundamentals of statistical analysis of medical biological data	5		3			2
Topic 6. Verification of statistical hypotheses. Correlative analysis.	6		3			3
Topic 7. Foundations telemedicine	6		3			3
Topic 8. Application telecommunications technologies in medicine. Telemedicine network "Regional center".	6		3			3
Contentful section 2. Methodology processing and medical analysis information						
Topic 9. Network systems diagnostics.	6		3			3
Topic 10. Formal logic in solutions tasks diagnostics, treatment and prevention diseases	6		3			3
Topic 11. Decision support methods. Strategies obtaining medical knowledge.	6		3			3
Topic 12. Means of forecasting. Clinical systems support decision-making.	6		3			3
Topic 13. Modeling of the support system adoption solutions	7		3			4
Topic 14. Types of information systems in the industry protection health.	7		3			4
Topic 15. Medical information systems level therapeutically - preventive institution Public health and protection health.	6		3			3
Topic 16. Final control of knowledge	3		3			
That's all hours	90		48			42

4. THEMES LECTURES

Lectures classes by program not provided for

5. THEMES PRACTICAL JOIN

No s/p	Name topics	Number hours
1.	Basic concept disciplines "Medical Computer Science"	3
2.	Coding and classification medical data	3
3.	Analysis biosignals. Visualization medical and biological data	3
4.	Processing and analysis medical images.	3
5.	Foundations statistical analysis medical and biological data	3
6.	Audit statistical hypothesis Correlative analysis.	3
7.	Foundations telemedicine	3
8.	Telemedicine "chain Regional center".	3
9.	Network systems diagnostics. Model telemedicine consultations	3
10.	Formal logic in solving the problems of diagnosis, treatment and prevention diseases	3
11.	Decision support methods. Acquisition strategies medical of knowledge	3

12.	Means of forecasting. Clinical acceptance support systems solutions	3
thirteen.	Modeling systems support adoption solutions	3
14.	Types informative systems in industry protection health.	3
15.	Medical information systems equal therapeutically – preventive institution	3
16.	Final CONTROL of knowledge	3
Together		48

6. INDEPENDENT WORK

No s/p	Name topics	Number Hour
1	Basic concept disciplines "Medical Computer Science"	2
2	Coding and classification medical data	2
3	Visualization medical and biological data	2
4	Processing and analysis medical images.	2
5	Foundations statistical analysis medical and biological data	2
6	Audit statistical hypothesis Correlative analysis.	3
7	Foundations telemedicine	3
8	Application telecommunications technologies in medicine	3
9	Model telemedicine consultations	3
10	Principles of solving the problems of diagnostics, treatment and prevention diseases	3
11	Methods support adoption solutions	3
12	Clinical systems support adoption solutions	3
thirteen	Modeling systems support adoption solutions	4
14	Types informative systems in industry protection health.	4
15	Medical informative systems equal therapeutically preventive institution	3
Together		42

7. INDIVIDUAL TASK

Individual task educational program not provided for

8. TASK FOR INDEPENDENT WORK

The task for independent work involves mastering the implementation method scientific search information by help Internet resources in boundaries proposed topics, as well as processing and presentation of search results for help programs of general and special purpose.

A component of independent work is the preparation of a portfolio - an ordered collection materials, selected in accordance to delivered topics, which students should prepare.

The exercise is intended to familiarize students with the basics modern computer informative technologies, trends of their development, to teach principles search data by help Internet resources, and mastery methods processing and representation data by help programs general and special purpose.

Composite method of the project is portfolio – arranged collection materials, selected according to delivered goals, which students should prepare

Task involves the performance of the following actions by the student: determining the relevance of the topic, formulating the purpose of the work and tasks; selection sources data

in accordance with the requirements; collection of data necessary for the disclosure of the selected topic; systematization and structuring of collected data; processing collected data; receiving and interpretation results; formulation of conclusions in accordance with the obtained results; design electronic version of the results; creation presentations and public protection.

9. METHODS TEACHING

Mastery discipline "Medical Computer Science" is realized on basis explanatory - illustrative, reproductive, problematic heuristic, research and interactive teaching methods. **Explanatory - illustrative** method is used in process teaching lecture material, under time seminary and practical classes **Reproductive** method are used in the process of assimilation of methods of mathematical analysis and statistical processing by students data, and also under time laboratory works, what provides following rules carrying out operations and serves to acquire the skill of following instructions, and thus - acquisition corresponding objective and professional competence, necessary in process implementation protocols treatment and carrying out clinical of research **Problem, research and heuristic** methods are used in the process independent and individual work students and foresee creative solution problematic tasks and application design approach Data methods serve formation of general and subject competencies such as: ability to analyze and synthesis of knowledge and received information, her analytical processing; skills using informative and communication technologies; modeling clinical situations, assessment of the relevance of medical measures. Representation of the specified methods teaching happens in process carrying out seminary classes **Interactive** methods serve acquisition students communication competencies, skills dialogical thinking and are used in the process of conducting practical classes, individual work student with teacher, and also in process remote teaching.

10. METHODS CONTROL

Methods control success development students programs disciplines "Medical Computer Science" is: orally poll; written (computer) test; written control work; audit acquired professional competencies by the results implementation practical tasks, and which are used for current control and final control initial control of learning success. Current control of learning success is carried out on to everyone practical occupation and is evaluated by 4-point scale.

Mastering the topic (current control) is monitored in practical classes according to specific goals. The following level assessment tools are used for this preparation students: level preparation to occupation, implementation practical tasks with interpretation and assessment their results, CONTROL practical skills Assimilation topics at the end of each content module is evaluated in practical final classes.

11. FORM CONCLUSION CONTROL GOOD LUCK TEACHING

Final CONTROL of knowledge with disciplines "Medical Computer Science" is carried out in form differentiated offset in on the 3rd semester teaching after study everyone topics planned given program Differentiated test with disciplines is conducted in the form of a written test for individual options, each of which contains 3 test tasks.

12. CALCULATION SCHEME AND DISTRIBUTION OF POINTS AWARDED STUDENTS

Only those students who do not have academic debt (all missed classes have been completed) and whose average score for the current educational activity in the academic discipline is at least "3" are admitted to the differential.

The maximum number of points that a student can score for the current educational activity

for admission to the exam is 120 points and is defined as the sum of the arithmetic average of all grades received in the semester.

The minimum number of points that a student must score for the current educational activity for admission to the exam is 72 points. Recalculation of the average grade for the current academic performance (on a 120-point scale) in the table. 3.

Table 3.

Recalculation of the average grade for current success in a multi-point scale for disciplines ending with a diploma

4-point scale	200-point scale	4-point scale	200-point scale	4-point scale	200-point scale
5	120	4.29	103	3.58	86
4.96	119	4.25	102	3.54	85
4.92	118	4.21	101	3.50	84
4.87	117	4.17	100	3.46	83
4.83	116	4.12	99	3.42	82
4.79	115	4.08	98	3.37	81
4.75	114	4.04	97	3.33	80
4.71	113	4.00	96	3.29	79
4.67	112	3.96	95	3.25	78
4.62	111	3.92	94	3.21	77
4.58	110	3.87	93	3.17	76
4.54	109	3.83	92	3.12	75
4.50	108	3.79	91	3.08	74
4.46	107	3.75	90	3.04	73
4.42	106	3.71	89	3	72
4.37	105	3.67	88	Less	Not
4.33	104	3.62	87	than 3	enough

The maximum number of points that a student can score when taking the Difzalik is 80 (the minimum number is at least 50).

Discipline assessment is defined comprehensively as the sum of points for the current educational activity and points for the exam.

From the allocated 120 points for the current educational activity, 4 to 12 additional points are allocated for the assessment of individual independent work of higher education applicants, according to the work curriculum. Encouragement points are added to the final grade for the discipline at the end of its study.

Points with disciplines for students, which successfully completed the program are converted into the national scale and ECTS system (Table 4, 5).

Table 4.

Discipline points	Evaluation on a 4-point scale
From 180 to 200 points	5
From 150 to 179 points	4
From 149 points to the minimum number of points that the student must score	3
Below the minimum number of points that the student must score	2

Table 5

Scale assessment: national and ECTS

Total points	Rating	Rating by national scale	
		for exam, difzalik	for offset

for all types teaching activities	ECTS		
180-200	A	perfectly	counted
160-179	B	okay	
150-159	C		
130-149	D	satisfactorily	
120-129	E		
50-119	FX	unsatisfactorily with the possibility of refolding	not counted with possibility rearrangement
0-49	F	unsatisfactorily with mandatory repeated studying the discipline	not counted with mandatory repeated study disciplines

13. METHODOLOGICAL SOFTWARE

- 1. Working curriculum of the discipline;
- 2. Plans of lectures, practical classes and independent work of students;
- 3. Methodical instructions for practical classes for students;
- 4. Methodical materials that ensure independent work of students;
- 5. Test and control tasks for practical classes;
- 6. List of questions for the differential score

14. RECOMMENDED LITERATURE The main one (basic)

1. Medical informatics in modules: practicum / I.E. Bulak , L.P. Voytenko , M.R. Mruga and others; by ed. I.E. Bulak . - K.: Medicine, 2012. - 208 p.
2. Handbook of Medical Informatics . Editors : JH van Bommel , M.A Musen . – <http://www.mieur.nl/mihandbook>; <http://www.mihandbook.stanford.edu>
3. Mark A. Musen B. Handbook of Medical Informatics // Electronic resource <ftp://46.101.84.92/pdf12/handbook-of-medical-informatics.pdf>
4. Edward H., Shortliffe J., Cimino J. Biomedical Informatics , 2014 // Electronic resource <http://www.rhc.ac.ir/Files/Download/pdf/nursingbooks/Biomedical%20Informatics%20Computer%20Applications%20in%20Health%20Care%20and%20Biomedicine-2014%20-%20CD.pdf>
5. Medical Informatics : Computer Applications in Health Care and Biomedicine , 2011 //Electronic resource <https://books.google.com.ua/books?id=WYvaBwAAQBAJ&pg=PA321&lpg=PA321&dq=book++medical+informatics&source=bl&ots=VjPvStLtk&sig=b39YVoBltS31QSJKUf4bnA jTqfY&hl=uk&sa=X&ved=0ahUKEwiqkeTdpIzQAhUGWSwKHTyIBfw4ChDoAQhHMA c#v=onepage&q=book%20%20medical%20informatics&f=false>

Auxiliary

1. Informatics in tables and diagrams: PC and its components, Windows operating system, Internet, the main ones and auxiliary devices, systemic and applied software software, modeling and programming / [Belousova L. AND., Olefirenko N. IN.]. — Kharkiv: Torsing plus, 2014. — 111 with.

2. Lopoch S.N. , Chubenko A.V., Babych P.N. Statistical methods in medical and biological research using the EXCEL. - K.: Morion , 2001. – 408 p.
3. Informational systems and technologies: Study _ help _ for study _ higher _ teach _ establishment / S.G. Karpenko , V.V. Popov , Yu.A. Tarnavskiy , G.A. Shportyuk . - K.: MAUP, 2004. - 192 with.
4. Paul J. Perry . Secrets World Wide Web . " Dialectics ". Kyiv . 1996. 576p. 5.
Medytsynskaya computer science : textbook / I.E. I would Yu.E. Pole, V.P. Martsenyuk, I.I.Haimzon . - K.: VSY "Medicine", 2012. - 424 p.
6. Medical Informatics = Medical Computer Science: textbook / I.E. I would Yu.E. Pole, V.P.Martsenyuk, I.Y. Haimzon . - K.: VSY "Medicine", 2012. – 368 p.
7. Informational technologies in psychology and medicine: textbook / I.E. I would I.I. Haimzon . - K.: VSV "Medicine", 2011. - 216 p.
8. Computer Science in tables and schemes: PC and his ingredients, operating room system windows, Internet, main and auxiliary devices, system and applied software support, modeling and programming / [Bilousova L. I., Olefirenko N. V.]. — Kharkiv: Torsing plus, 2014. — 111 p.
9. Basics of informatics. Microsoft Office 2013 (Word, PowerPoint in practice): training . help _ / M. M. Drin , N. V. Romanenko; Ministry of Education and Science of Ukraine, Chernivtsi . national _ Univ named after Yu. Fedkovicha. — Chernivtsi: Cherniv . national _ University, 2014. — 75 p.
10. Informatics and informative technologies: practicum for org . work students on practice _ and laboratory _ classes / Yu. Yu. Squirrel, IN. AT. Laver , Yu. IN. Andrashko , I. M. Lyakh; Ministry of Education and Science of Ukraine, Uzhhor State University of Higher Education . national _ Univ., Ft information _ of technologies, Kaf. of computer science and physics and mathematics. discipline — Uzhgorod: Outdoor - layer, 2015.
11. Computer Science : practicum with information _ technologies / I. M. Glynskyi — Ternopil: Understudy . and manual , 2014. — 302 p.
12. Mintzer O.P. Computer Science and protection health / O.P. Mintzer // Medical Computer Science and engineering – 2010. – No. 2. – P.8 -21
13. Computer modeling in pharmacy: Study _ help _ for honey. university IV r.a. _ Recommended Ministry of Health / Bulak I.E. and others — K., 2016. — 208 p.

15. INFORMATIONAL RESOURCE

1. <https://support.office.com/uk-ua/> (For reference and educational materials package Microsoftoffice)
2. www.uacm.kharkov.ua (Ukrainian association "Computer Medicine")
3. www.mednavigator.net (Medical search system)
4. www.rmj.ru (Internet versions periodic publications)
5. www.medinfo.com.ua (Medical search system of Ukraine)
6. www.medico.ru (Medical search system)
7. www.medinf.nmu.ua (Informative resource educational and methodical materials with disciplines "European standard computer literacy").