MINISTRY OF HEALTH OF UKRAINE
KHARKIV NATIONAL MEDICAL UNIVERSITY

Department of Medical and Biological Physics and Medical Informatics
Academic year 2021-2022

SYLLABUS OF THE EDUCATIONAL COMPONENT
"MEDICAL INFORMATICS"

Normative or selective educational component normative

Form of education full-time
(full-time, part-time, remote)

Field of knowledge 22 «Health care»
(code and name of the training direction)

Major field 222 «Medicine»
(code and name of the specialty)

Specialization (if available) _____

Educational and professional program (educational and scientific program) «Medicine»

The second (master's) level of higher education

Year: 1

This syllabus was approved at the meeting of the department of medical and biological physics and medical informatics

Record № 7 dated
27 August 2021,

Acting Head of Department

_____ prof. O.V. Zaytseva

Approved by the methodological committee on international students training (KhNMU)

Record № 1 dated
31 August 2021,

Head

_____ S.O.Krasnikova

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Consultations (face-to-face consultations: schedule and venue; online consultations: schedule, links to electronic resources): face-to-face and online consultations are conducted according to the schedule of the department or by prior arrangement with the teacher.

Location: Kharkiv, 4 Nauki Ave., main building, 2nd floor, Department of Medical and Biological Physics and Medical Informatics.

INTRODUCTION

The syllabus of the discipline "Medical Informatics" is compiled in accordance with the educational-professional program 222 "Medicine" and the Project of Standard of Higher Education of Ukraine, the second (master's) level, field of knowledge 22 "Health care", specialty - 222 "Medicine".

Description of the discipline (abstract). The discipline "Medical Informatics" is taught to acquaint students with the laws and principles of information processes in systems of different levels of the hierarchy of health care, the problems of collecting, storing, processing and transmitting signals and images in pediatrics, decision support systems in pediatrics; information technologies of analysis, modeling, forecasting, management in the field of medical and biological research, the theory of medical information systems.

The subject of study of the discipline "Medical Informatics" is the information processes in the field of health care, involving the use of digital technologies.

Interdisciplinary connections. Educational discipline "Medical Informatics":

- is based on the study of a number of disciplines by students: medical and biological physics, medical biology, morphological disciplines and integrates with these disciplines;
- lays the foundations for the study of disciplines: social medicine, health care and biostatistics, epidemiology, hygiene and ecology, sociology and medical sociology, radiology (radiation diagnostics and radiation therapy);
- promotes the study of clinical, hygienic and social disciplines by students;
- involves the effective use of digital technologies in the process of further education and professional activities.

In the general system of training a future doctor, the discipline "Medical Informatics" belongs to the cycle of natural science training.
The discipline is a compulsory subject.

Prerequisites. The study of the discipline "Medical Informatics" involves the preliminary mastering of credits in the discipline "Medical and Biological Physics".

Postrequisites. The main provisions of the discipline "Medical Informatics" should be used in the study of professional disciplines.

1. The purpose and objectives of the discipline.

1.1. The purpose of teaching the course "Medical Informatics" is: formation and development in future doctors of competence in the field of digital technologies for ensuring rational use of modern software of general and special purpose in the processing of biomedical data, studying the laws and principles of information processes in systems of different levels of the hierarchy in the field of health care, problems collecting, storing, processing and transmitting signals and images in medicine, decision support systems in medicine; information technology analysis, modeling, forecasting, management in the field of biomedical research, theory of medical information systems.

1.2. The main tasks of studying the discipline "Medical Informatics" are: acquainting students with the laws and principles of information processes in systems at different levels of the healthcare industry hierarchy, problems of collecting, storing, processing and transmitting signals and images in pediatrics, decision support systems in pediatrics; information technologies of analysis, modeling, forecasting, management in the field of biomedical research, theory of medical information systems.

As a result of studying the discipline, the student must
know:

the possibilities for new healthcare information and communication technologies, the basics of telemedicine and the future of digital technology;
basic concepts of databases, features of specialized databases of evidence-based medicine;
principles of formalization and algorithmization of medical problems, basics of modeling in medicine and pediatrics;

be able to:

independently master medical and general purpose software, to use computer technologies of visualization and statistical analysis of data of biomedical researches; work with decision support systems in medicine and pediatrics leverage the capabilities of Web technologies.

1.3. Competences and learning outcomes, the formation of which is facilitated by the discipline "Medical Informatics".

1.3.1. According to the requirements of the Standard, the discipline "Medical Informatics" provides students with the acquisition of **competencies**:

- ***integral*:**

ability to solve typical and complex specialized tasks and practical problems in professional activities in the field of health care related to the use of personal computers and work with general purpose programs, and involves research and / or innovation and is characterized by complexity and uncertainty requirements.

- ***general*:**

– ability to apply knowledge in practical situations;
– ability to choose a communication strategy; ability to work in a team; interpersonal skills;
– skills of using information and communication technologies;
– ability to abstract thinking, analysis and synthesis, ability to learn and be modernly trained;
– ability to apply knowledge in practical situations;
– ability to evaluate and ensure the quality of work performed;
– definiteness and perseverance in terms of tasks and responsibilities.

- **special (professional, subject):**

– ability to process state, social, economic and medical information:
– under any circumstances, using standard procedures, including modern computer information technology, be able to: determine the source and / or location of the required information depending on its type; receive the necessary information from a specific source; process and analyze the received information:
– demonstrate computer skills and search for biomedical data using information technology;
– identify opportunities for the use of information technology and computers in medicine;
– use methods of processing medical information;
– explain the principles of formalization and algorithmization of medical problems, the principles of modeling in biology and medicine.

1.3.2. The study of the discipline "Medical Informatics" provides students with the following program learning outcomes:

Integrative learning outcomes, the formation of which is facilitated by the discipline, is the *formation of the future pediatrician's competence in the field of digital technologies*.

The main learning outcomes of the discipline include:

– the student's ability to effectively use system and application software in the field of health care;

– ability to independently master general and medical software;

– ability to apply computer technologies of visualization and statistical analysis of data of medical and biological researches;

– ability to search and process data in specialized databases of evidence-based medicine;

– ability to develop decision support systems in medicine and pediatrics;

– ability to efficiently process medical data in a Web-oriented environment;

– ability to implement information processes in the field of health care, involving the use of digital technologies.

As a result of studying the discipline the student must **know**:

– basic concepts of the discipline (data, information, messages, message scheme, types and properties of information, coding of information, units of information, information carriers, information processes and their types, medical data, their types and properties, methods and digital tools of medical processing data, information technologies and their types, tools of information technologies, stages of development and evolution of information technologies);

– basic concepts of network technologies and telemedicine (computer network, classification of computer networks, topologies of local networks, global networks, data transmission protocols, TCP / IP protocol, IP-addressing, DNS-addressing, URL-address, Web-technologies and their characteristics, cloud technologies and cloud data processing, telemedicine, the main areas of application of telemedicine, methods of information protection, the principles of secure networking);

– database concept and information resources of evidence-based medicine (database, database management systems (DBMS), DBMS architecture, data models (hierarchical, network, relational, object-oriented), stages of relational database design, programming language of structural queries SQL for working with databases, specialized databases of evidence-based medicine (Cochrane Library, Medline / Pubmed, Trip, etc.));

– technologies of digital medical images and biosignals processing (basic concepts of digital image processing, analog and digital images, raster and vector digital images, color schemes, basic digital image storage formats, digital medical image, stages of digital medical image formation, methods of digital medical image production (computed tomography, magnetic resonance imaging, positron emission tomography, ultrasound, angiography, endoscopy, etc.), 2D, 3D, 4D digital image formats, medical standard for creating, storing, transmitting and visualizing digital medical images DICOM, DICOM-file, network DICOM-protocol, basic principles of work with DICOM Viewer and open source program ImageJ for analysis and processing of medical images, digital biomedical signals and methods of their reception (electrocardiography, rheography, electroencephalography, electromyography, audiometry, electrogastrography));

– computer technologies of statistical analysis of medical research data processing (basic concepts of statistics, methods of descriptive statistics, correlation and regression analysis, methods of statistical testing of hypotheses);

– computer technologies of modeling and decision support in biomedical research, practical medicine and pediatrics (model, types of models, modeling, stages of modeling, basics of algorithmization, types and properties of algorithms, basic programming operators, expert systems and

their types, personalized intelligent digital devices and systems, artificial intelligence, areas of application of robotics in medicine);

– theory of medical information systems (information systems, medical information systems and their types, clinical use of information technologies, electronic medical card of the patient, electronic prescription, electronic signature).

2. DESCRIPTION OF THE COURSE

<table>
<tr><td rowspan="2">Name of indicators</td><td rowspan="2">Area of knowledge, direction of training, educational qualification level</td><td>Characteristics of the discipline</td></tr>
<tr><td>Full-time education</td></tr>
<tr><td>Number of credits – 3</td><td>Training direction:
22 «Health care»
(code and name)</td><td>normative</td></tr>
<tr><td rowspan="5">Total number of hours – 90</td><td rowspan="5">Specialty:
222 «Medicine» - masters,</td><td>Year of training:</td></tr>
<tr><td>1-st</td></tr>
<tr><td>Term</td></tr>
<tr><td>1-st</td></tr>
<tr><td>Lectures</td></tr>
<tr><td rowspan="9">Hours for full-time study:
classroom - 44
student's independent work – 46</td><td rowspan="9">Education level:
masters</td><td>6 h.</td></tr>
<tr><td>Practical classes</td></tr>
<tr><td>38 h.</td></tr>
<tr><td>Laboratories</td></tr>
<tr><td>0 h.</td></tr>
<tr><td>Independent work</td></tr>
<tr><td>46 h.</td></tr>
<tr><td>Individual tasks: 0 h.</td></tr>
<tr><td>Type of control: credit</td></tr>
</table>

2.1. The structure of the discipline

2.2.1. Topics of the lectures

№	The name of topic	Number hours	Види лекцій
1	Basic concepts of the discipline "Medical Informatics". History of formation of "Medical Informatics" and prospects of its development in the context of experience of informatization of society	2	personal, online, video presentation
2	Basics of statistical methods of medical and biological data processing	2	personal, online, video presentation
3	Decision Support Methods in Medicine. Strategies for obtaining medical knowledge.	2	personal, online, video presentation
Totally lecture hours		**6**	

2.2.2. Topics of practical classes

№ з/п	Name of topic	Methods teaching	Forms control	Number hours
1	Basic concepts of medical informatics. The computer in the future doctor's activity	story-explanation, conversation, presentation, practical (independent performance by students of tasks on personal computers in computer classes	oral questioning tests	2
2	Healthcare information resources			2
3	Creation and maintenance of medical records			4
4	Construction of databases of medical institutions. Design and development of a clinical laboratory database			4
5	Medical information systems. Creating a patient's electronic medical record (EMR)			4
6	Control work Chapter 1			2
7	Techniques of working with medical information by means of the Table processor		tests	2
8	Methods of biostatistics. Statistical analysis of biomedical data		oral questioning tests	4
10	Formal logic in solving problems of diagnostics, treatment and prevention of medical diseases			4
11	Decision-making methods and systems. Decision support through forecasting methods			4
12	Computer-aided Mathematical Modeling in Biomedical Research			2
13	Multimedia presentation of biomedical data		speech with a given topic	2
14	Control work chapter 2.		tests	2
Totally hours for practical classes				**38**

2.2.3 Independent work

№ з/п	Назва теми	Кількість годин	Методи навчання	Форми контролю
1	Coding and classification.	5	Narrative-explanation, conversation, demonstration, presentation, discussion, modeling of processes and situations, case method, method "Brainstorming", webinar, virtual consultation and tutorial, briefing	- individual tasks; - abstracts; - annotations; - mutual control; - self-control; - report; - speech with a given topic; - poster report
2	Visualization of medical and biological Medical image processing and analysis.	5		
3	Analysis of biosignals. Methods of processing biosignals	5		
4	Mathematical modeling in biology and medicine	5		
5	System analysis	5		
6	Cybernetics	5		
7	Formal logic in solving problems of diagnostics, treatment and prevention of diseases	5		
8	Expert systems in medicine	5		
9	Decision making	6		
Total hours of independent student work		**46**		

3. EVALUATION CRITERIA

3.1. Evaluation of the success of education of students is carried out on the basis of the current "Instructions for evaluating the educational activities of students of KhNMU", approved by the Order of KhNMU from 21.08.2021 №181.

3.1.1 Evaluation of current learning activities (PND)

Current control

The control of mastering the topic (current control) in practical classes is carried out by checking the quantity and quality of practical tasks on this topic on the computer in accordance with the "Guidelines for students in the discipline of" Medical Informatics ". Thus the student can receive an estimation from 2 to 5 points. It is not obligatory to conduct a test control in a practical lesson.

If the student wants to improve his / her grade, the teacher should offer him / her an oral examination on the topic or a computer (Moodle) test on the questions written in the current academic year.

Practice of missed classes (nb) and unsatisfactory grades ("2") is carried out by the teacher of the group by oral questioning or computer testing of the student on this topic.

Final control

The final control of mastering the material of each Section is carried out by the teacher in the form of writing by each student an individual written Test (25 test tasks), compiled on the topics of Practical classes. Criteria for evaluating the test:

15-19 correct answers - grade "3",
20-23 correct answers - grade "4",
24-25 correct answers - grade "5".

After writing the second test, the average score is calculated for two sections (on a traditional scale), which is converted into points on a 200-point scale (Table 1 "Guidelines for the evaluation of educational activities in the European credit transfer system of the educational process"). The teacher puts these points in the student's record book with the mark "**credit**" and fills in the Credit book of students in the discipline according with the form: U-5.03A - **credit**.

The recalculation of the average grade for IPA at the end of the first semester is carried out in accordance with Table 1.

Table 1

Recalculation of the average score for the current activity into a multi-scale scale (for subjects completed by credit)

4-mark scale	200-point scale	4-mark scale	200-point scale	4-mark scale	200- point scale
5	200	4.22-4,23	169	3.45-3,46	138
4.97-4,99	199	4.19-4,21	168	3.42-3,44	137
4.95-4,96	198	4.17-4,18	167	3.4-3,41	136
4.92-4,94	197	4.14-4,16	166	3.37-3,39	135
4.9-4,91	196	4.12-4,13	165	3.35-3,36	134
4.87-4,89	195	4.09-4,11	164	3.32-3,34	133
4.85-4,86	194	4.07-4,08	163	3.3-3,31	132
4.82-4,84	193	4.04-4,06	162	3.27-3,29	131
4.8-4,81	192	4.02-4,03	161	3.25-3,26	130
4.77-4,79	191	3.99-4,01	160	3.22-3,24	129

4.75-4,76	190	3.97-3,98	159	3.2-3,21	128
4.72-4,74	189	3.94-3,96	158	3.17-3,19	127
4.7-4,71	188	3.92-3,93	157	3.15-3,16	126
4.67-4,69	187	3.89-3,91	156	3.12-3,14	125
4.65-4,66	186	3.87-3,88	155	3.1-3,11	124
4.62-4,64	185	3.84-3,86	154	3.07-3,09	123
4.6-4,61	184	3.82-3,83	153	3.05-3,06	122
4.57-4,59	183	3.79-3,81	152	3.02-3,04	121
4.54-4,56	182	3.77-3,78	151	3-3,01	120
4.52-4,53	181	3.74-3,76	150	**Less 3**	**Unsatisfactory**
4.5-4,51	180	3.72-3,73	149		
4.47-4,49	179	3.7-3,71	148		
4.45-4,46	178	3.67-3,69	147		
4.42-4,44	177	3.65-3,66	146		
4.4-4,41	176	3.62-3,64	145		
4.37-4,39	175	3.6-3,61	144		
4.35-4,36	174	3.57-3,59	143		
4.32-4,34	173	3.55-3,56	142		
4.3-4,31	172	3.52-3,54	141		
4,27-4,29	171	3.5-3,51	140		
4.24-4,26	170	3.47-3,49	139		

3.1.2. The individual tasks of the student (IE) are evaluated in points (not more than 10), which are added to the points scored on the IPA at the end of the study of the discipline before the "test". Points for individual work are accrued to the student if he has completely and qualitatively filled in his Workbook or performed other tasks proposed by the teacher in the discipline, and is a maximum of 10 points.

The total amount of points for IPA and SCI may not exceed 200 points.

3.1.3. Grade from the discipline

The grade in the discipline is defined as the sum of points for IPA and IPR and ranges from 120 to 200 points.

The correspondence of the scores on the 200-point scale according to the ECTS scale and to the four-point (national) scale is given in Table 2.

Table 2

Correspondence of scores on the 200-point scale to the ECTS scale and to the four-point (national) scale

200 - point scale	ЄКТС - point scale	Score for four-point (national) scale
180–200	A	Exlellent
160–179	B	Very good
150–159	C	Good
130–149	D	Satisfactory
120–129	E	Sufficiency
Less 120	F	Unsatisfactory

A student receives a mark "credited" to the record book if he scored from 120 to 200 points.

3.2. Test questions

Answers to test questions occur during the current control and final tests.

3.3. Control questions

1. Definition of computer science as a science. Tasks of computer science. Medical informatics.
2. The concept of "information message", "data", "signal", "communication channel".
3. Measuring the amount of information.
4. The structure of a personal computer.
5. Personal computer software. Software classification.
6. Operating systems and their classification.
7. The main components of computer networks. Basic communication model.
8. Classification of computer networks.
9. Internet addressing: IP-address, domain name (DNS-address); URL.
10. Use of Internet services.
11. Principles of forming a search query. Types of search.
12. General purpose search engines.
13. Specialized medical search systems.
14. Medical resources Internet.
15. The concept of the semantic triangle.
16. Definition of classification and its examples.
17. Types of codes: numerical, mnemonic, hierarchical, comparison codes.
18. Coding system MKH, DSM, SNOMED, ICPC.
19. Definition of formalization and algorithmization.
20. Types of algorithms: linear, branched, cyclic.
21. Centralized and distributed databases, hierarchical and network databases, specialized databases.
22. The main groups of technical devices used in medical diagnostics.
23. Describe the main components of diagnostic MAPC.
24. Types of noise and their influence on the definition of measured parameters.
25. The main categories of electrophysiological indicators.
26. Types of bioelectrical indicators of direct and indirect measurements.
27. Types of research conducted with the help of MAPC.
28. Information system, classification of MIS, their purpose.
29. Consulting and diagnostic systems and their types.
30. Medical hardware and software complexes, their classification.
31. Automated doctor's place.
32. Classification of MIS level of treatment and prevention facilities.
33. Electronic medical record, basic levels of computerization of medical history.
34. Classification of MIS territorial level.
35. The current situation in the field of information security.
36. Categories of information security: confidentiality, integrity, secrecy, protection, authenticity, appeal, reliability, accuracy, controllability, identification control.
37. Protection of medical information, the degree of protection of information (GIS) about patients.
38. Characteristics affecting information security.
39. Problems of protection of medical secrecy.
40. Classification of information security violations.
41. Modeling of GIS creation processes.
42. Workbook in MS Excel, its type.
43. Erroneous values in MS Excel.
44. Construction of charts (graphs) in MS Excel.
45. Use in medicine MS Excel.
46. Using MS Excel to process statistics.

47. Definition of general and sample populations.
48. Data types. Measurement scales.
49. Types of graphical description of data.
50. Distribution histogram. Algorithm for its construction.
51. Numerical characteristics of the general population: average, variance, standard deviation.
52. Parametric and nonparametric methods of statistics.
53. Statistical hypotheses.
54. Descriptive statistics for samples with a normal distribution law.
55. Descriptive statistics for samples with a distribution law other than normal.
56. Statistical functions for calculating descriptive statistics in the package LibreOffice Calc.
57. Types of relationships between variables. Statistical connection.
58. Correlation dependence. Pearson's linear correlation coefficient. Spearman's rank correlation coefficient.
59. Coefficient of determination in linear regression. Its relationship with the correlation coefficient.
60. Criteria for comparing the significance of the difference between the average of the two samples.
61. Student's criterion of comparisons of two means.
62. Mann-Whitney test to compare the two samples.
63. Expert systems as a class of artificial intelligence systems. The specifics of the implementation of expert systems based on formal and informal logic.
64. The main criteria for the feasibility of creating expert systems.
65. The composition of a typical expert system.
66. Characteristic features of expert systems (field of application, design features, method of solving problems, etc.).
67. Logic inference machine. Direct and inverse logical inference.
68. Tools of expert systems.
69. Knowledge base of the expert system, static, dynamic, working knowledge. Source of knowledge of the expert system. Ways of obtaining knowledge by the system.
70. Basic models of knowledge representation: production, frames, semantic networks, logical, neural networks.
71. The use of expert systems in medicine.
72. Artificial neural networks (AR). Features of their work. Areas of application of NM.
73. Classification of NM, training of NM.
74. Expert systems (EC) as a class of artificial intelligence systems. The specifics of the implementation of expert systems based on formal and informal logic. criteria for the need to create expert systems.
75. Components of a typical EC, the characteristics of the EC (scope, design features, method of solving problems, etc.).
76. The machine of logical inference. Direct and inverse logical conclusion.
77. Tool devices EC.
78. EU knowledge base. Static, dynamic, working knowledge. Sources of EU knowledge. Ways to gain knowledge of the system.
79. Models of knowledge representation: production, frames, semantic networks, logical, neural networks.
80. The concept of approximation model, types of approximation models implemented in the spreadsheet LibreOffice Calc.
81. The concept of "forecast" and "forecasting", the accuracy of any forecast, the main sources of forecast errors.
82. The method of "gold standard" for diagnosis. Characteristics of sensitivity and specificity of the diagnostic test?
83. Definition of Bayes' theorem.

84. Data to assess the likelihood of disease in a positive test.
85. Types of modeling, degree of complexity and adequacy of the mathematical model.
86. Examples of energy, material, mathematical models in medicine.
87. Limitations and advantages of the method of mathematical modeling.
88. Model "predators - victims".
89. Description of the immunological model.
90. Description of the population growth model.
91. Description of the model of infection spread.
92. Multimedia technologies, categories of multimedia products, possibilities of multimedia technologies.
93. Multimedia in medicine, multimedia program "LibreOffice Impress".

3.4 Individual tasks (the list approved at the meeting of the department with the determination of the number of points for their performance, which can be added as incentives):

The individual tasks of the student (IE) are evaluated in points (not more than 10), which are added to the points gained for the current educational activity (IPA) at the end of the study of the discipline before the "test". Points for individual work are accrued to the student if he has completely and qualitatively filled in his Workbook or performed other tasks proposed by the teacher in the discipline, and is a maximum of 10 points.

3.5 Rules for appealing the assessment

If the student does not agree with the grade obtained in class, he can appeal it. In this case, the student's knowledge will be assessed by a commission consisting of the head or head of the department, an independent teacher and a teacher of the group in which the student is studying. To increase the grade, the group teacher may also ask the student to choose a topic to write an essay.

4. DISCIPLINE POLICY

(system of requirements and rules of conduct for higher education students in the discipline, including the teacher's reaction to late tasks, missed classes, behavior in the classroom, requirements for medical clothing, etc., separately indicate the availability and conditions of training for people with special educational needs).

Discipline requirements (system of requirements and rules that the teacher imposes on students of higher education when studying the discipline)

For successful mastering of the discipline it is necessary that the student of higher education systematically prepares for practical classes, performs the tasks offered for mastering the topics recommended for self-study, reads the recommended literature, takes an active part in discussing the topic in class.

Attendance and behavior (inadmissibility of absences, delays, clothing requirements, medical examination, etc.).

Attendance at practical classes in the discipline is mandatory (except for good reasons). A class missed by a student for any reason must be completed. It is unacceptable to be late for class. By the time the class begins, the student must be dressed in a medical gown. During the lesson you can not eat or drink, chew gum, contaminate the surfaces of classrooms. When communicating with the teacher and others, the student must be polite, talk quietly and behave calmly.

Use of electronic gadgets

The use of any electronic gadgets (smartphones, watches, tablets, laptops, etc.) throughout the lesson is strictly prohibited unless the teacher specifically allows their use. If the teacher sees that the student is violating this requirement, he can remove the student from the classroom.

Policy for people with special educational needs

For persons with special needs, the requirement of academic integrity is applied taking into account their individual needs and capabilities.

Recommendations for successful completion of the discipline (activity of higher education students during practical classes, fulfillment of the required minimum of educational work)

To successfully complete the discipline, the applicant must complete the required minimum of academic (classroom and independent) work specified in the curriculum of the discipline. When assessing the lesson is also taken into account diligence, accuracy of the student, activity in discussing the topic, speed and creativity of thinking, perseverance in learning.

Encouragement and penalties (additional points for conferences, research, edits, advice, participation in surveys)

To encourage students who are particularly active and persistent in their studies, they are awarded additional points for participating in scientific conferences, research, surveys, etc. For violation of discipline (rules of conduct, uniforms, etc.) and academic integrity during classes, the student may be subject to penalties - removal from the class, re-assessment (test, exam, test, etc.); re-taking the training course; deductions from the educational institution.

Safety precautions

During the lesson, the student must follow the rules of life safety.

When conducting laboratory work or practical classes it is necessary to follow the rules of fire safety, students need to know the location of the primary means of fire extinguishing (fire extinguisher, capes of fire-retardant fabric, sand).

In the event of an accident, the victim or eyewitness must immediately notify the teacher. If equipment, computers, fixtures and tools malfunction, stop working and notify the instructor.

During the class, students must follow the order of laboratory work and practical classes, the rules of personal hygiene, remove foreign objects from the workplace and ensure its cleanliness.

It is not recommended to leave unattended electrical appliances and devices, including computers. If malfunctions are found in the operation of electrical devices that are under voltage, their increased heating, sparks, the smell of burnt insulation, smoke, immediately stop work, turn off the power supply and notify the teacher.

5. ACADEMIC INTEGRITY

Adherence to academic integrity by the student provides:

independent performance of educational tasks, tasks of current and final control of learning outcomes; references to sources of information in the case of the use of ideas, statements, information; compliance with copyright law; providing reliable information about the results of their own educational (scientific, creative) activities.

Academic plagiarism, writing off, deception, falsification, etc. are considered violations of academic integrity. For violation of academic integrity, students may be held subject to the following academic liability: re-assessment (test, exam, test, etc.); re-taking the training course; deductions from the educational institution.

6. RECOMMENDED LITERATURE

1. Handbook of Biomedical Informatics

Електронний ресурс:
https://en.wikipedia.org/wiki/Book:Handbook_of_Biomedical_Informatics

2. E.H. Shortiffe. Biomedical Informatics: Computer Applications in Health Care and Biomedicine 4-th edition / Edward H. Shortiffe, James J. Cimino // New York: Springer. – 1037 p.

3. David J. Lubliner. Biomedical Informatics: An Introduction to Information Systems and Software in Medicine and Health // Auerbach Publications. 2015. – 434 p.

4. Nanette B. Health Information Management Technology: An Applied Approach 5th ed. Edition // American Helath Information Management Association. 2016 – 686 p.

5. Mervat Abdelhak. Health Information: Management of a Strategic Resource, 5th Edition / Mervat Abdelhak, Mary Alice Hanken // Saunders; 5 edition 2015. – 800 p.

6. Handbook of Medical Informatics. J.H. Editors, V. Bemmel, M.A. Musen // Electronic resource http://www.mieur.nl/mihandbook; http://www.mihandbook.stanford.edu

7. Mark A. Musen B. Handbook of Medical Informatics // Електронний ресурс ftp://46.101.84.92/pdf12/handbook-of-medical-informatics.pdf

8. Edward H., Shortliffe J., Cimino J. Biomedical Informatics, 2014 // Електронний ресурс http://www.rhc.ac.ir/Files/Download/pdf/nursingbooks/Biomedical%20Informatics%20Computer%20Applications%20in%20Health%20Care%20and%20Biomedicine-2014%20-%20CD.pdf

9. T.L. Hebda. Handbook of Informatics for Nurses & Healthcare Professionals (5th Edition) / T. L. Hebda, P. Czar // Kindle Edition. 2012. – 624 p.

10. Medical Informatics: Computer Applications in Health Care and Biomedicine, 2011 // Електронний ресурс https://books.google.com.ua/books?id=WYvaBwAAQBAJ&pg=PA321&lpg=PA321&dq=book++medical+informatics&source=bl&ots=VjPvStLtIk&sig=b39YVoBltS31QSJkUf4bnAjTqfY&hl=uk&sa=X&ved=0ahUKEwiqkeTdpIzQAhUGWSwKHTyIBfw4ChDoAQhHMAc#v=onepage&q=book%20%20medical%20informatics&f=false

7. INFORMATIONAL SOURSES

1. http://repo.knmu.edu.ua/handle/123456789/162 (сайт ХНМУ)
2. Handbook of Biomedical Informatics
3. https://en.wikipedia.org/wiki/Book:Handbook_of_Biomedical_Informatics
4. Societies: www.amia.org, http://imia-medinfo.org/wp/, www.himss.org, www.tmi.or.th
5. U.S. Office of the National Coordinator for Health IT: http://www.healthcareitnews.com
6. Journals in the Field Biomedical Informatics:
7. Healthcare Informatics www.healthcare-informatics.com
8. Journal of the American Medical Informatics Association: www.jamia.org

8. OTHER

Useful links:

1. Regulations on prevention, prevention and settlement of cases related to sexual harassment and discrimination in KhNMU http://files.knmu.edu.ua:8181/upload/redakt/doc_uchproc/polog-sex.doc

2. Regulations on academic integrity and ethics of academic relations at Kharkiv National Medical University
http://files.knmu.edu.ua:8181/upload/redakt/doc_uchproc/polog_ad_etyka_text.pdf

3. The procedure for conducting classes on in-depth study by students of Kharkiv National Medical University of certain disciplines beyond the scope of the curriculum http://files.knmu.edu.ua:8181/upload/redakt/doc_uchproc/nak-poriad-pogl-vyv-dysc.docx

4. Regulations on the Commission on Academic Integrity, Ethics and Conflict Management of KhNMU http://files.knmu.edu.ua:8181/upload/redakt/doc_uchproc/polog_komis_ad_text.pdf

5. Regulations on recognition of results of non-formal education in Kharkiv National Medical University http://files.knmu.edu.ua:8181/upload/redakt/doc_uchproc/polog_neform_osv.pdf

6. Inclusive education:

http://www.knmu.kharkov.ua/index.php?option=com_content&view=article&id=7108%3A2021-03-10-14-08-02&catid=12%3A2011-05-10-07-16-32&Itemid= 33 & lang = uk

7. Academic integrity:

http://www.knmu.kharkov.ua/index.php?option=com_content&view=article&id=2520%3A2015-04-30-08-10-46&catid=20%3A2011-05-17-09-30-17&Itemid=40&lang=uk

http://files.knmu.edu.ua:8181/upload/redakt/doc_uchproc/kodex_AD.docx