

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
«LOGIC. FORMAL LOGIC»

Normative or selective educational component selective

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

Field of knowledge 22 «Healthcare»
(code and name of the field of study)

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

Specialization (if available) _____

Educational and professional program «Medicine»


The second (master's) level of higher education

Year: 2

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

Record № 7 dated
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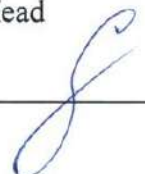
Acting Head of Department

 prof. O.V. Zaytseva

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

Record № 1 dated
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Head



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INTRODUCTION

Syllabus of the discipline "Logic. Formal Logic" is compiled in accordance with the educational-professional program (hereinafter - EPP) "Medicine" and the Standard of Higher Education of Ukraine (hereinafter - the Standard), the second (master's) level, field of knowledge 22 "Health care", specialty 222 "Medicine".

Description of the discipline (abstract)

Learning discipline "Logic. Formal logic" students get to know the basic principles and operations of thought, which helps developing and improving of logic and other mental skills. Discipline teaches, in particular, to generalize, to abstract to focus, and to reveal the idea and composition of the whole, to connect its parts, to identify the main and separate it from the secondary, to see the unusual in the ordinary. Based on the development of skills and practical techniques of logically consistent thinking, on a system of moral principles, on the methodology of scientific knowledge, the discipline serves to improve the culture of thought in general.

The subject of the discipline is the study of human thought, formal thinking, and the formalization of knowledge in the medical field.

Interdisciplinary links: The discipline "Logic. Formal logic ":

- is based on the study of a number of disciplines by students: medical and biological physics, medical informatics and integrates with these disciplines;
- lays the foundations for the study of fundamental and clinical disciplines;

In the general system of training of the future doctor the discipline "Logic. Formal logic" refers to the cycle of scientific training

Prerequisites and co-requisites of the discipline

Prerequisites. Studying the discipline "Logic. Formal Logic" includes preliminary mastering of the disciplines "Medical and Biological Physics", "European Computer Driven Linence".

Co-requisites. The main features of the discipline "Logic. Formal logic" should be used in the study of such disciplines as "Medical Informatics", "Philosophy and Methodology of Science", "Biostatistics", "Biostatistics and Clinical Epidemiology", "Social and Demographic Statistics", "Communication in the Public Sphere" and others.

URL of the discipline in MOODLE <http://distance.knmu.edu.ua/course/view.php?id=966>

1. PURPOSE AND TASKS OF THE COURSE

1.1 The goal and objectives of the discipline

The purpose of teaching the discipline "Logic. Formal logic": formation and development of the competence of future dentists in the field of digital technologies to ensure the rational use of modern general and special purpose software in the processing of medical and biological data, study of patterns and principles of information processes in systems of different levels of hierarchy in health care, problems collection, storage, processing and transmission of signals and images in medicine, decision support systems in medicine; information technologies of analysis, modeling, forecasting, management in the field of medical and biological research, theory of medical information systems.

1.2 The main tasks of studying the discipline "Logic. Formal logic" is: to teach students effectively construct correct reasoning and find the causes of logical errors and ways to avoid

them; to form knowledge about forms and laws of thought and to explain their practical value for professional activity of the future specialist. As a result of studying the discipline the student must

know:

basic laws and rules of logic; methods of applying knowledge in solving both theoretical and practical issues; know the basic terms, definitions of the basics of logic

be able to:

analyze the received information; apply knowledge in practice; place the selected information in a certain sequence and in an understandable form

1.3. Competences and learning outcomes formed by the discipline (the relationship with the normative content of training of higher education, formulated in terms of learning outcomes in the Standard).

1.3.1. In accordance with the requirements of the Standard, the discipline helps students with the acquisition of **competencies**:

integrated:

- ability to apply the acquired knowledge, solve complex problems and practical problems in the professional activity of a doctor with the application of theories, provisions, principles and norms of the humanities, basic and clinical sciences in terms of information and complexity.

general:

- ability to think abstractly;
- ability to analyze and synthesize the received information;
- the ability to form, organize, consistently express their thoughts;
- ability to draw up and implement plans and personal projects;
- ability to interactively use teaching aids;
- ability to process and interpret empirical data;
- desire for autonomous activity;
- ability to function in heterogeneous groups;
- readiness to act in accordance with moral norms and ethical principles;
- the ability to identify and justify goals that relate to their own values and are the meaning of life;
- ability to cooperate, show initiative and maintain relationships with others;
- ability to apply theoretical knowledge and gain practical experience in solving life and professional problems;
- ability to use information technology in everyday life;
- ability for self-organization and free development of personality.

special (professional, subject):

- ability to logical, dialectical thinking;
- the ability to see errors in reasoning and identify them;
- ability to understand the meaning of life priorities and guidelines;
- ability to think critically;
- ability to solve test problems of varying complexity;
- ability to keep a special logical terminological dictionary;
- ability to search and accumulate the necessary specialized information on the logic and disciplines of the philosophical cycle;
- ability to summarize primary sources and scientific publications on logic;
- ability to implement in practice the acquired theoretical and practical knowledge;
- ability to analyze the mechanisms of formation of logical ideas and teachings in the cultural process of mankind;
- ability to synthesize the acquired knowledge from philosophical disciplines into a holistic worldview.
- ability to analyze communicative problems related to logical errors and techniques;
- ability to master the methods and techniques of dialogue, discussion.

1.3.2. The study of the discipline provides students with the acquisition of the following program learning outcomes:

1. Knowledge of the basic laws and rules of logic;
2. Knowledge of methods of applying knowledge in solving both theoretical and practical issues;
3. Knowledge of basic terms, definitions of the basics of logic
4. Ability to analyze the received information; apply knowledge in practice;
5. Ability to place selected information in a certain sequence and in an understandable form

1.3.3. The study of the discipline provides students with the following social skills (Soft skills):

- to use software in the field of health care;
- to search and process data in a Web-oriented environment;
- to implement information processes in the field of health care, involving the use of digital technologies.
- to search and process medical data in specialized databases of evidence-based medicine (Cochrane Library, Medline / Pubmed, Trip, etc.);
- apply computer technologies of statistical analysis of medical research data processing;
- apply methods of planning, conducting a medical experiment, analysis and processing of data.
- develop clinical, personalized intelligent decision support systems for practical medicine;

2. INFORMATION SCOPE OF THE COURSE

Indicators	Field of knowledge, specialty, educational degree, EPP	Characteristics of the discipline	
		Full-time education	external form of education
Number of credits - 4	Field of knowledge <u>22 "Health care"</u> (code and name)	selective	
The total number of hours – 120	Specialty: <u>«222«Medicine»</u> (code and name) Specialization: <hr/>	Year of education (course):	
		2-nd	
		Semester	
		2-nd	
		Lectures	
		0 hours	hours
Hours for full-time (or evening) form of study: classes - 20 independent work - 100	Educational degree: <u>the second (master's) level</u> EPP <u>«Medicine»</u>	Practical, seminar	
		hours	hours
		Laboratory	
		20 hours	hours
		independent work	
		100 hours	hours
		Type of final control: 0 hours	
		Type of final control: credit	

2.1 Description of the discipline

Lecture topics

№ з/п	Topic	Hours
	Всього лекційних годин	0

Topics of practical classes

№ з/п	Topic	Hours
1	The subject of logic. Laws of logic. Thinking and language.	2
2	Semiotic nature of logic	2
3	Concept as a form of thought	2
4	Logical operations on concepts	2
5	The concept of judgment as a form of thinking	2
6	Modal judgments. Question	2
7	General characteristics of inference	2
8	Deductive inference	2
9	Probable inferences: inductive inference and inference according to the "analogy" scheme.	2
10	Logical bases of the theory of argumentation.	2
11	Credit	
	Total hours of practical classes	20

Independent work

№ з/п	Topic	Hours
1	History of logical knowledge. Sign, types of signs, structure of sign process	14
2	Types of operations on concepts: generalization, restriction, division, definition	14
3	Modal judgments	14
4	Syllogism as a type of deductive reasoning: types, structure, rules	14
5	Proof and refutation: structure, types, rules.	14
	Total hours of independent student work	70

3. Evaluation system

3.1. Criteria for assessing the level of knowledge, conditions of admission to the final control

1. Evaluation of current educational activities (IPA). Control of mastering the topic (current control) in practical classes is carried out in accordance with specific objectives with the use of entrance test control, oral examination and testing of practical skills.
2. At the end of the study of the discipline is calculated the average grade for the entire period of its study (on a traditional scale). The conversion of the average grade for IPA into a grade on a multi-point scale is carried out in accordance with the Table 1.

Table 1

Recalculation of the average score for current activities in a multi-point scale (for disciplines ending by credit)

4-point scale	200-point scale	4-point scale	200-point scale	4-point 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	Not enough
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		

Final control (credit) is carried out upon completion of the elective course at the last seminar.

The grade in the discipline is equal to the average number of points obtained for the entire period of study of the discipline, listed in accordance with Table 1. These points are placed in the student's record book with the mark "**worked out**". Information on the success of students in the discipline is filled in the form: Y-5.03A – **credit**.

Conditions of admission to the final control.

Students who have received at least 70 points in the IPA and do not have unsatisfactory grades and skipping classes are allowed to take the final control.

Elimination of academic debt (working off)

Elimination of academic debt is carried out in the form of an oral interview of the student or writing a test task on the topic of the lesson. To work off the debt, the student can also prepare an essay on the topic.

3.2 Questions for module control and independent work

1. The concept of logic as a science.

2. The object of study of logic.
3. The concept of predicate.
4. Conjunction operation.
5. Disjunction operation.
6. Operation of implication.
7. Laws of logic and their writing in the language of predicate logic.
8. "Concept" as a form of thinking.
9. "Judgment" as a form of thinking.
10. "Inference" as a form of thinking.
11. Separation of concepts.
12. Classification of concepts.
13. Hypothesis and its types.
14. Logical and practical proof.
15. Means of demonstrating the thesis of proof.
16. Rules of proof and refutation.
17. Generalized induction.
18. Bacon-Mill induction methods.
19. Operations of formal logic.
20. Logical models of knowledge.
21. Reduction of expressions
22. Laws of thinking
23. Forms of thinking
24. Induction
25. Deduction
26. Analogy
27. Inference
28. Automatic verification of rules
29. The concept
30. Limitations and generalizations of the concept
31. Evidence. Types of evidence
32. Proof to the contrary
33. Direct proof
34. Rebuttal. Types of refutation
35. Theory of argumentation and its position
36. Methods of conducting and organizing medical experiments
37. Scientific induction

3.3. Control questions

1. Hypothetical-deductive and abductive methods
2. Inductive model of discovery
3. Formalization of deductive, inductive inferences, and inference by analogy.
4. Hypothetical-deductive model of scientific knowledge
5. Forms of argumentation
6. Formal and informal approach to modeling medical knowledge.
7. Natural and artificial means of verifying the truth of the conclusions.

3.4. Individual tasks not provided by the curriculum.

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 AND VALUES

Discipline requirements 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 independent study, reads the recommended literature, takes an active part in discussing the topic of the lesson in the classroom.

Class attendance and behavior

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 inadmissible to be late for classes. 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. If the teacher sees that the student violates this requirement, he can remove the student from the classroom and put him "absent".

5. ACADEMIC INTEGRITY POLICY

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.

Regulations on 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

Regulations on Academic Integrity and Ethics of Academic Relations at Kharkiv National Medical University:

1. http://files.knmu.edu.ua:8181/upload/redakt/doc_uchproc/polog_ad_etyka_text.pdf
2. 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
3. http://files.knmu.edu.ua:8181/upload/redakt/doc_uchproc/kodex_AD.docx

6. Recommended literature

Base literature

1. Гетманова А.Д. Учебник по логике. 2-е изд. - Москва: "ВЛАДОС", 1995. 303 с.
2. Плескунов М. А. Основы формальной логики : учебное пособие. Екатеринбург: Изд-во Урал, ун-та, 2014. 168 с.
3. Рузавин Г.И. Логика и основы аргументации. Учебник для вузов. Москва: Проект, 2003. 304 с.
4. Пономарев А.Б. Методология научных исследований: учеб. пособие / А.Б. Пономарев, Э.А. Пикулева. Пермь: Изд-во Перм. нац. исслед. политехн. ун-та, 2014. 186 с.
5. The logic of domains/David Ribes et al. Soc Stud Sci. 2019. 49(3). P. 281-309. <https://doi.org/10.1177/0306312719849709>
6. The logic of universalization guides moral judgment/Sydney Levine et al. Proc Natl Acad Sci USA. 2020. №117(42). P. 26158-26169. <https://doi.org/10.1073/pnas.2014505117>
7. Leila A. A., Frahnaz S., Mustafa L. An Expert System to Diagnose Pneumonia Using Fuzzy Logic. Acta Inform Med. 2019. №27(2). P. 103-107. <https://doi.org/10.5455/aim.2019.27.103-107>.

Additional literature

1. Грядовой Д. И. Логика: общий курс формальной логики. 3-е изд., перераб. и доп. Москва: Юнити, 2015. 326 с.
2. Рузавин Г. И. Синергетика и сложноорганизованные системы. Epistemology & Philosophy of Science. 2008. №1. URL: <https://cyberleninka.ru/article/n/sinergetika-i-slozhnoorganizovannye-sistemy>
3. Сорокин П. Социальная и культурная динамика: Исслед. изм. в больших системах искусства, истины, этики, права и обществ. отношений [Social & Cultural dynamics: A Study of Change in Major Systems of Art, Truth, Ethics, law and Social Relationships] / Питирим Сорокин; Пер. с англ. В. В. Сапова. Санкт-Петербург: Изд-во Рус. Христиан. гуманитар. Ин-та, 2000. 1054 с.