PRIVATE HIGHER EDUCATIONAL INSTITUTION
"INTERNATIONAL ACADEMY OF ECOLOGY AND MEDICINE"
Department of social medicine and humanitarian disciplines

"APPROVED"

Head of Department
Lyudmila DUDARENKO
"31" August 2022

WORKING PROGRAM OF EDUCATIONAL DISCIPLINE

" Social medicine, public health "

"Biostatistics" module

LEVEL OF HIGHER EDUCATION Second (master's) level
DEGREE OF HIGHER EDUCATION Master's degree
BRANCH OF KNOWLEDGE 22 Healthcare
SPECIALTY 222 Medicine, 221 Dentistry

Reviewed and approved
at the meeting of the department of social medicine and
humanitarian disciplines
Protocol No. 1 dated August 31 , 2022

Kyiv 2022

Working program of educational discipline **Social Medicine, Public Health** for the preparation of students of higher education of the second (master's) level of higher education in specialtys 222 Medicine , 221 Dentistry.

Developer : Phd in medicine Z.H. Krushinska

Agreed

The first vice-rector _____ Oleksandra SOROKA

INTRODUCTION

The program of the educational discipline " Social medicine, public health " is compiled in accordance with the educational and professional program for training specialists of the second (master's) level of specialties 222 "Medicine" and 221 "Dentistry", field of knowledge 22 "Health care", Law of Ukraine "On Higher Education" dated 01.07.2014 No. 1556-VII (Article 13, Clause 7), Provisions "On the Organization of the Educational Process at the International Academy of Ecology and Medicine", methodological recommendations approved by the Central Methodological Office of the Higher Education of medical education of the Ministry of Health of Ukraine regarding the development of programs of educational disciplines in accordance with industry standards of higher education. The discipline "Social medicine, public health" belongs to the section of General training of the curriculum for the preparation of students of higher education of the second educational (master's) level.

The educational discipline "Social medicine, public health" involves mastering:

biostatistics , which involves the definition and analysis of basic biostatistical indicators and criteria based on the principles of evidence-based medicine;

population health statistics based on the analysis of a complex of medical indicators (demographic, morbidity, disability, physical development);

health care organizations, i.e. system activities to ensure preservation, strengthening, and restoration of population health, including medical care organizations and public health systems;

the economic foundations of the system of medical care for the population based on the study of the organizational and legal basis of the activity of health care institutions in market conditions, economic analysis and methods of evaluating financial and economic activity in the field of health care.

Description of the academic discipline

Name indicators	Field of knowledge, direction of training (specialty), educational and qualification level	Characteristics of the academic discipline
		full-time education
The number of credits is 3	Branch of knowledge: **22 "Healthcare"**	
Modules - 1		**Year:**
Content module - 2	Specialty: **222 "Medicine", 221 "Dentistry"**	3rd
		Semester
The total number of hours is 90		V th
		Lectures
	Education level: **master**	20 hours
		Practical training
		30 hours
		Independent (individual) work
		40 hours
		type of control
		final control

The subject of study of the academic discipline is modern principles of evidence-based medicine, theoretical and methodological foundations of biostatistics, laws of population health, health care system, its organization and economy.

Interdisciplinary connections.

" Social medicine, public health " as an academic discipline:

is based on students' study of academic disciplines: history of medicine, informatics, ethics, hygiene and ecology, epidemiology, sociology and medical sociology, fundamentals of economic theories;

lays the foundations for the study of the organization of the treatment and diagnostic process, as well as the assessment of its scope and quality when studying clinical disciplines;

provides a study of the legal and organizational foundations of the health care industry;

contributes to the formation of the preventive direction of activities of future doctors, taking into account the possible impact on the health of the population of factors of various origins, risk assessment in the development of complex medical and social measures in interaction with the public health system;

contributes to the formation of an economic worldview and basic competence characteristics regarding the methodology of economic analysis of the activities of medical institutions in modern conditions.

1. PURPOSE OF THE STUDY AND TASK OF THE EDUCATIONAL DISCIPLINE

1.1. **The purpose of studying the educational discipline " Social medicine, public health " is** to master the necessary knowledge, skills and acquire competences in research, analysis and evaluation of population health indicators, organization, resource provision and activity of the health care system, development from the standpoint of evidence of medicine, recommendations on prevention and elimination of the harmful effects of factors on health and on improving the organization of medical assistance to the population and the public health system.

1.2. **The main tasks of the academic discipline "Social medicine, public health" are** :

mastering the theoretical foundations of biostatistics;

mastering modern principles of evidence-based medicine;

familiarization with methods of definition and analysis of basic biostatistical indicators and criteria;

assimilation of methodical and theoretical bases of formation of statistical aggregates for their further adequate analysis;

assimilation of the methods of definition, analysis and assessment of the main indicators of population health according to separate criteria and in relation to the factors affecting it;

assimilation of regularities and features of the formation of population health;

mastering the principles of developing measures to preserve and strengthen the health of the population and its individual contingents;

mastering the theoretical foundations and legal foundations of the health care system, its functions and strategic directions of development;

mastering the principles, directions, tasks of the public health system;

mastering the basics of the organization of medical care, the principles of evaluating the organization and the quality of providing various types of medical care to the population in the conditions of reforming the health care sector;

formation of knowledge on the issue of disability examination, its types, order of organization and actions of medical workers regarding specific situations of disability examination;

mastering the principles of development of management solutions aimed at improving the activities of health care institutions;

mastering the basics of economic analysis of the activity of a medical institution;

mastering the principles of analysis and evaluation of financial and economic indicators of the economic activity of medical institutions for the purpose of rational use of available resources;

formation of knowledge on issues of price policy, strategic and tactical planning of the economic development of a medical institution;

familiarization with the development of a business plan for entrepreneurial activity in the health care system.

1.3. Competences and learning outcomes , the formation of which contributes to the discipline:

1.3.1. <u>Integral competence</u> is the ability to solve typical and complex specialized tasks and practical problems in professional activities in the field of health care, or in the learning process, which involves conducting research and/or implementing innovations and is characterized by the complexity and uncertainty of conditions and requirements.

1.3.2. General competences :

ability to apply knowledge in practical situations;

knowledge and understanding of the subject area and understanding of the profession;

the ability to self-regulate and lead a healthy lifestyle, the ability to adapt and act in a new situation;

the ability to choose a communication strategy; ability to work in a team; interpersonal skills;

skills in using information and communication technologies;

the ability to abstract thinking, analysis and synthesis, the ability to learn and be modernly educated;

the ability to evaluate and ensure the quality of performed works;

determination and persistence in relation to assigned tasks and assumed duties;

the ability to act socially responsibly and consciously.

1.3.3. Special (professional, subject) competences :

the ability to assess the main indicators of population health;

the ability to assess the impact of socio-economic and biological determinants on health, their trends in different population groups, risk determination;

the ability to identify manifestations of health inequalities caused by social determinants and develop appropriate measures to reduce them;

the ability to apply basic concepts and concepts of evidence-based medicine and biostatistics when planning, conducting and interpreting research results;

the ability to organize the provision and integration of medical assistance to the population;

the ability to ensure control over the quality of provided health care services at an appropriate level;

the ability to plan and conduct disease prevention measures among the population, including in cooperation with public health specialists;

the ability to develop and implement systems for monitoring and evaluating the effectiveness of interventions in preventive and diagnostic or screening programs;

the ability to analyze the activity of the health care system, institutions, divisions or health care professionals;

the ability to conduct an examination of working capacity;

ability to process state, social and medical information.

ability to carry out advocacy, communication and social mobilization in the field of public health using various communication channels and techniques;

ability to identify health priorities, conduct needs assessments, develop and implement evidence-based strategies, and propose evidence-based interventions.

Matrix of competences

No	Competence	Knowledge	Skill	Communication	Autonomy and responsibility
1	2	3	4	5	6
1.	Conducting epidemiological and medical-statistical researches on the health of the population	Knowledge of epidemiological (descriptive, analytical) and medical-statistical research methods. Knowledge of the requirements for diagnostic tests that can be used for screening studies. Knowledge of risk indicators and methods of their calculation	To have standard methods of descriptive, analytical epidemiological and medical-statistical studies. Be able to calculate and evaluate indicators of individual and population health, in dynamics and when compared with average static data.	The ability to formulate conclusions about the state of health of the population based on the data of epidemiological and medical-statistical studies. The ability to interact with specialists of the information and analytical units in order to obtain data on the state of health of the population.	Responsibility for the validity of conclusions regarding the state of health of the population
2..	Processing of medical information.	Knowledge of standard procedures, including modern computer information technologies, for processing medical information.	Be able to determine the source of finding the necessary information; ability to perform statistical processing of material and analysis of received information.	The ability to form conclusions based on the analysis and statistical processing of the received information.	Responsibility for high-quality and timely processing and analysis of statistical information.
3.	Assessment of the impact of socio-economic and biological determinants on health.	Knowledge of socio-economic and biological determinants that affect the health of the population	To be able to evaluate the relationship and influence of socio-economic and biological factors on the health of an individual, family, population health.	The ability to formulate conclusions regarding the influence of socio-economic and biological factors on the health of the population.	Responsibility for the validity of assessments of risk factors for the health of the population.
4.	Carrying out measures for the organization and integration of medical care.	Knowledge of the health care system. Knowledge of types of medical care and main types of health care facilities.	Be able to organize your own work and working in a team with junior staff or in an interdisciplinary team; determine the patient's rational medical route.	The ability to interact, including informationally, with colleagues.	Responsibility for the validity of conclusions regarding the improvement of the organization, routing and ensuring the integration of medical care.
5.	Carrying out measures to ensure the quality and safety of medical care.	Knowledge of the main characteristics of the quality of medical care. Knowledge of the main components of improving the quality of medical care, requirements for medical standardization	To be able to control the quality of medical care based on statistical data, expert evaluation and sociological research data, to identify factors that prevent	The ability to obtain the necessary information from specified sources. Ability to inform relevant officials to ensure conditions regarding	Responsibility for the validity of management decisions at the level of a doctor, institution, unit regarding the improvement of the quality of medical care.
6.	Carrying out an examination of working capacity.	Basic knowledge of medical and social expertise. Knowledge of the main normative documents regulating	To be able to determine the presence and degree of life restrictions, the type, degree and duration of	The ability to organize interaction with the head of the unit, the medical and advisory commission (MCC),	Responsibility for the validity of decisions regarding the medical and social examination of work capacity

		the establishment of the type, degree and duration of incapacity for work. Knowledge of the main types of temporary disability and the procedure for its implementation.	disability in a simulated clinical and organizational situation based on data about the disease and its course. Be able to draw up relevant documents certifying temporary incapacity.	the medical and social expert commission (MSEK) on the issues of work capacity examination.	
7.	Conducting an analysis of the activity of a doctor, unit, health care institution.	Knowledge of the main indicators characterizing the activity of the main types of health care institutions and units. Knowledge of the main medical and organizational factors that affect the activity of the doctor of the unit, health care institution.	Be able to calculate and evaluate the main indicators of the activity of a doctor, unit, medical care facility. Be able to detect activity defects and the reasons for their formation. To be able to substantiate management decisions regarding the improvement of the activity of the doctor and the health care institution.	The ability to receive information from relevant sources about the activities of a doctor, unit, health care institution.	Responsibility for the validity of decisions regarding the improvement of the activity of the doctor, institution/health care unit.
8.	Implementation of preventive measures.	Knowledge of the principles and methods of promoting a healthy lifestyle. Knowledge of the state of health of the patient and the population and the principles of prevention.	Be able to assess the health status of patients and the population in the service area Be able to organize promotion of a healthy lifestyle, primary prevention of diseases and injuries among the population.	Based on the results of the analysis of the health status of the population, prepare information for local management and health care authorities; regarding health promotion.	To be responsible for the timely and high-quality implementation of measures to assess the health status of contingents of the population, measures to improve health and improve health, advocate a healthy lifestyle, and primary prevention.
9.	Maintenance of medical documentation	Knowledge of the official document management system in the professional work of a doctor, including modern computer information technologies.	Be able to determine the source and location of the required information depending on its type. Be able to process information and analyze the received information.	The ability to receive the necessary information from a specified source. The ability to form conclusions based on the analysis of the received information.	Responsibility for the completeness and quality of information analysis and conclusions based on its analysis.

Learning outcomes .

1. Integrative final program learning outcomes , the formation of which is facilitated by the educational discipline:

acquiring knowledge, skills and acquiring competences in assessing the health status of the population and the influence of determinants on it, risk assessment, as well as the development and implementation of preventive measures aimed at preserving, strengthening the health and social well-being of the population;

acquiring knowledge, skills and acquiring competences in evaluating the activity of the health care system, institutions, divisions or health care professionals; identifying and

eliminating negative factors affecting their work, as well as developing measures to improve the organization and improve the activities of health care professionals and institutions.

2. Learning outcomes for the discipline.

As a result of studying the discipline "Social medicine, public health", the student should know:

definition of social medicine, public health as an educational discipline and its role in the health care organization system;

theoretical and methodological foundations of social medicine and public health;

basic organizational elements of statistical research;

methodological bases and criteria for choosing the main adequate methods of analysis for testing statistical hypotheses;

theoretical and methodical bases of analysis of statistical results, their evaluation and description in order to form reasonable conclusions;

peculiarities of interpretation of the concept of "health", indicators of population health;

regularities in the formation of the demographic situation, its features in different countries;

components of the medical and social significance of morbidity and methods of its study;

classification of risk factors, assessment of their possible impact on public health;

legal principles of modern health care;

basic principles and types of medical assistance to the population, peculiarities of medical provision of various contingents of the urban and rural population (women, children, workers of enterprises, elderly people);

the organization and content of the work of medical institutions and doctors of the main specialties (family, district therapists and pediatricians, obstetricians-gynecologists, geriatricians, doctors of emergency medicine, hygienists, etc.);

principles of mandatory and voluntary health insurance;

features of management systems and components of the management process

the main strategic and tactical plans for the economic development of the medical institution;

definition of a marketing strategy that will ensure the maximum satisfaction of the population's needs in medical care;

determination of the price policy aimed at the implementation of the strategic and operational tasks of the medical institution;

development of a business plan for entrepreneurial activity in the health care system;

the basic principles of determining the insurance premium for voluntary health insurance;

principles of determining the optimal payment method for medical service providers;

stages of conducting an economic analysis of the activities of medical institutions and enterprises.

As a result of studying the discipline "Social medicine, public health", the student should be able to:

analyze and evaluate the state of health of the population;

analyze and evaluate state, social and medical information using standard approaches and computer information technologies;

assess the impact of adverse factors on the state of health of the population (individual, family, population) in the conditions of a medical institution according to standard methods, assess risk;

determine public health priorities, conduct needs assessment, propose science-based measures and develop appropriate strategies;

to plan disease prevention measures among the population to prevent the spread of diseases;

carry out advocacy, communication, and social mobilization in the field of public health using various communication channels and techniques;

to analyze and evaluate the activity of the health care system, its legal, financial, personnel support;

to carry out statistical, economic and financial and economic analysis of the effectiveness of health care institutions;

develop and plan management solutions aimed at improving the activities of health care institutions;

to organize the provision of medical services, to ensure control over the quality of the provided services at the appropriate level;

draw up strategic and tactical plans for the economic development of the medical institution;

draw up business projects in the field of health care;

form goals and determine the structure of personal activity based on the result of the analysis of certain social and personal needs;

to be aware of and be guided in their activities by civil rights, freedoms and duties, to raise the general educational cultural level.

2. INFORMATION VOLUME OF THE EDUCATIONAL DISCIPLINE

270 hours, 9 ECTS credits are allocated to the study of the academic discipline . The discipline is divided into 4 modules, studied in the 3rd, 4th and 6th years. Module 1 "Biostatistics" is one of the 4 modules of the discipline "Social medicine, public health", the study of which is allocated 90 hours, 3 ECTS credits.

3. PROGRAM OF EDUCATIONAL DISCIPLINE

The types of training sessions according to the curriculum are lectures, practical sessions, independent work of students and consultations.

The lectures cover the main theoretical material of a single or several topics of the academic discipline, reveal the main problematic issues of the relevant sections of the discipline.

Practical classes involve a detailed examination by students of individual theoretical provisions of the academic discipline with the teacher and the formation of the skills and abilities of their practical application through the student's individual performance of formulated tasks and solving situational problems.

The independent work of students involves the student's mastery of the educational material, namely, the independent study of individual topics of the academic discipline in the time free from mandatory educational classes, and also involves preparation for all types of control. The educational material of the discipline provided by the working curriculum for assimilation by the student in the process of independent work is submitted to the final control along with the educational material that was worked out during classroom classes.

Consultations (individual or group) are held with the aim of helping students to understand and clarify issues that are difficult for independent understanding, to solve

complex problems that arose during independent processing of educational material in preparation for a practical class, a final class or before an exam.

Adequate teaching methods are used when studying the discipline.

According to the sources of knowledge, teaching methods are used: verbal - story, explanation, lecture, instruction; visual - demonstration, illustration; practical - practical work, problem solving. According to the nature of the logic of knowledge, methods are used: analytical, synthetic, analytical-synthetic, inductive, deductive. According to the level of independent mental activity, methods are used: problem-based, partially research-based, research.

Specific goals of the academic discipline:

master the theoretical foundations, modern principles of evidence-based medicine;

master the theoretical foundations of biostatistics;

determine and analyze the main biostatistical indicators and criteria;

to master the methodical and theoretical foundations of the formation of statistical aggregates for their further adequate analysis;

evaluate the results of the analysis according to separate criteria and in relation to the factors affecting them.

Topic 1. Social medicine and public health as a science.

Social medicine and public health as a science and subject of teaching. Global health trends, modern challenges and threats. Healthcare systems: strategic directions of development.

Topic 2. Biostatistics as a methodological basis for analysis and assessment of the health of the population and the health care system. Basics of evidence-based medicine.

Methodology of analysis and assessment of population health. Definition of the terms "biostatistics", "evidence-based medicine", "clinical epidemiology". The main stages of the development of biostatistics. Outstanding scientists and their contribution to the development of biostatistics. Basic principles of evidence-based medicine. Triad of evidence-based medicine. Theory and practice of evidence-based medicine. Evidence-based medicine and quality of clinical research. Concept of final results. Evidence-based medicine and quality of medical care. Standardization of medical care: clinical protocols, standards and recommendations.

Topic 3. Methodological foundations of the organization of statistical research.

Methodological foundations, forms and methods of statistical observation and data collection. Accuracy of observations.

Topic 4. Data types. Methods of collecting statistical material.

Types of data, qualitative and quantitative data. Use of different measurement scales: absolute, ordinal, interval, ratios. Methods of collecting statistical material: direct registration, copying, survey. Types of questionnaires, their characteristics. Marketing and sociological surveys, types of questions in questionnaires, problems of organizing surveys in health care.

Topic 5. Organization and planning of statistical research.

Theory and concept of statistical observation, stages of its implementation. Planning a statistical study. The purpose and objectives of the research. Sources of statistical information. Object of research, unit of observation. Types of research by volume: selective and continuous. Concept of general and selective population. Requirements for the formation

of a sample population. Types of sampling. Types of research by time: one-moment, dynamic (prospective and retrospective).

Topic 6. Compilation of statistical research programs.

Program of statistical observation. Layout of the registration mark. Grouping of statistical data, methods, values. Types of groupings, principles of building statistical groupings and classifications. Comparison of statistical groupings. Concept of multidimensional classifications. Encoding and encryption of data. Program for the development and compilation of statistical material. Statistical tables, their characteristics, types, rules for building a table layout. Methodical basics of reading and analyzing tables.

Topic 7. Relative quantities. Key rules of probability.

Concept of statistical indicators, their types, form of presentation. Absolute data, relative values, their practical significance. Types of relative quantities (intensive, extensive, relative intensity, ratio, visibility), their calculation method and methodical bases of application for data analysis. Concepts and types of structure of medical and biological data, structural changes, features of their analysis. Key rules of probability.

Topic 8. Graphic methods of analysis.

Graphic methods of data analysis. Types of diagrams (linear, columnar, internal columnar, sector, radial, cartograms and cartograms, rules for their construction, correctness of use. Modern methods of graphic representation, infographics, animation of diagrams, interactive diagrams.

Topic 9. Average values. Measurement of central tendency. Indicators of variation.

Average values in clinical and epidemiological studies, their practical significance. Elements and characteristics of variational series. Average values: their types, methods of calculation, features of use. The concept of variation, its meaning. Variability of population parameters, assessment methods. Absolute indicators of variation (amplitude, mean square deviation) and relative indicators of variation (coefficients of variation and determination), their assessment. Measures of variation, concepts of distribution laws, their types, characteristics. Estimation of normality of distribution, "jumping out" options. The rule of "three sigma", its practical use.

Topic 10. Method of standardization.

Problems of comparison of statistical indicators in heterogeneous populations. Types of standardization methods: direct, indirect, reverse. Characteristics of the stages of the standardization method. Formulation of the null hypothesis. Selection and calculation of the standard. Calculation of expected numbers. Calculation of standardized indicators. Null hypothesis testing, evaluation of results. Practical significance of the standardization method.

Topic 11. Assessment of the probability of research results.

Assessment of the probability of the obtained results. Concept of internal and external validity. The level of significance of statistical criteria. Null and alternative hypotheses. Hypothesis testing. Average error of mean and relative value, confidence interval. Estimation of the probability of difference: Student's t-test, calculation method, its evaluation, typical errors of use. Paired and multiple comparisons. Newman-Keuls criterion, Tukey's criterion. Fisher's exact test. Peculiarities of using non-parametric criteria: Mann-Whitney, Kruskal-Wallis.

Topic 12. Characteristics and analysis of statistical errors.

Error of the 1st and 2nd kind. Typical mistakes at the stages of conducting research. Random and systematic error.

Topic 13. Parametric methods of probability estimation.

Selective observation as a source of statistical information. Average error of mean and relative value, confidence interval. Estimation of the probability of difference: Student's t-test, calculation method, its evaluation. Peculiarities of use on small samples. Student's table.

Topic 14. Non-parametric methods of probability estimation.

Justification of cases of use of non-parametric assessment methods, their significance. Types of compared populations, their characteristics. Analysis and evaluation of results in related populations, sign test, Wilcoxon test. Statistical hypothesis testing for independent samples. Analysis of qualitative features. Conjugation tables. Chi-square criterion, its evaluation and practical application.

Topic 15. Correlation-regression analysis.

Studying the relationship between quantitative variables. The concept of functional and correlational connection. Strength and direction of communication. Types of correlation coefficients. Pearson's linear correlation coefficient, its evaluation, characteristics. Non-parametric methods of relationship assessment - Spearman's rank correlation coefficient. Pair and multiple correlation coefficients. Regression analysis, regression coefficient, regression equation. Using regression analysis for forecasting.

Topic 16. Series of dynamics and their analysis.

Basic rules of construction and analysis of dynamic series when studying the dynamics of medical and biological phenomena. Series levels. Types of dynamics series: simple and complex, interval and instantaneous. The main indicators of dynamic series analysis: absolute growth, growth/decrease rate, growth rate. The main methods of processing a dynamic series in order to determine the trend. Dynamic series alignment methods: least squares; variable mean, averaging on the left and right sides; increasing intervals. Forecasting based on extrapolation of dynamics series.

Topic 17. Epidemiological studies in health care, their classification. Empirical and experimental studies.

Classification of epidemiological studies. Comparative characteristics of various types of research, assessment of the degree of evidence of their results. Retrospective and prospective studies. Empirical studies (descriptive and analytical). Descriptive epidemiology: description of a single case and case series. Analytical epidemiological studies. Cohort and case-control studies.

Topic 18. Characteristics of experimental research. Randomized clinical trials are the "gold standard" of conducting research.

The procedure for conducting randomized clinical trials. "Gold standard".

Topic 19. Design of epidemiological studies: case-control, cohort, randomized clinical studies.

Design of epidemiological and clinical studies. Research ethics. Types of design. Types of control. Blinding of the study. Required sample size. Selection of the object and research units. Inclusion and exclusion criteria. Concepts of randomization and stratification.

Topic 20. Screening tests: characteristics and basic requirements Concept of sensitivity and specificity .

Screening. Assessment of screening results. Requirements for screening tests. Sensitivity and specificity of the screening test. Relationship of sensitivity and specificity. The concept of ROC analysis. Prognostic factors and risk factors, their meaning and possibilities of use. Determination of risk indicators in a case-control study. Absolute,

relative and additional population risk: method of calculation and evaluation. The concept of chances in epidemiology. Determination of the odds ratio indicator in a cohort study: calculation method and evaluation.

Topic 21. The concept of risk factors. Indicators of risk factors.

Risk indicators: absolute, relative and additional population risk. Odds.

Topic 22. Risk factors. Methodology for calculating risk indicators and their assessment.

Risk factors. Odds ratio indicator. Methodology of calculation and assessment.

Topic 23. Screening. Methodology for assessing the sensitivity and specificity of screening tests.

Screening. Requirements for screening tests. Sensitivity and specificity of the screening test: method of calculation and assessment.

Topic 24. Overview of modern methods of statistical analysis (dispersion, multivariate, cluster).

The concept of one-way analysis of variance (ANOVA) and multi-way analysis of variance (MANOVA). Patient survival analysis (Kaplan-Meier method). Concept of cluster analysis.

Topic 25. Statistical research software and the procedure for presenting scientific papers.

Overview of the main packages of statistical data processing (Excel, Access, Statistica, Stata, SPSS, SAS): advantages, disadvantages, accessibility, mastery problems.

Topic 26. Information provision of epidemiological and clinical studies.

Medical information: its components, problems of information search. Databases of literature, medical libraries. Generalization of clinical research results.

Topic 27. Generalization of statistical research results. Systematic reviews and meta-analysis.

Analytical reviews. The concept of meta-data. Systematic reviews and meta-analysis. The Cochrane Collaboration: History and Activities.

Topic 28. Medical statistics, the role in the analysis of the health of the population and the activity of the health care system.

Medical statistics: theoretical foundations, subject and content, tasks, sections. Principles of construction and activity of the Medical and Statistical Service of Ukraine. Center of Medical Statistics. Information flows in the system of medical statistics.

Topic 29. Accounting and reporting documentation. Electronic document management.

Accounting documentation. Activities of information and analytical departments of health care institutions. The concept of electronic document management in health care.

Topic 30. Databases on population health. Organization and conduct of statistical research in public health.

Databases on population health (European and domestic databases "Health for all"): design, content, capabilities.

Topic 31. Organization and conduct of statistical research in public health.

Research activity in public health in Ukraine and abroad.

Topic 32. Use of biostatistics knowledge in the daily practice of a doctor.

The place and role of biostatistics in medical education and the work of a practicing physician.

Topic 33. Procedure for presenting scientific works.

Types of scientific works (thesis, article, methodological recommendations, monograph, textbook, dissertation). The order of presentation of scientific works: design, publication, speech, presentation.

Topic 34. Basics of preparing a scientific publication.

The structure of scientific work (purpose, scope and methods, results of own research, conclusions). Peculiarities of design of scientific works (presentation of data in tables, graphic images). Rules for creating references to sources of information, list of literature.

4. STRUCTURE OF THE EDUCATIONAL DISCIPLINE

No	Name of topics	Number of hours			
		L.	PRAC.	S.S.	In total
1.	Social medicine and public health as a science	1	-	-	1
2.	Biostatistics as a methodological basis for analysis and evaluation of the health of the population and the health care system. Basics of evidence-based medicine	1	-	-	1
3.	Methodological foundations of the organization of statistical research	1	-	-	1
4.	Data types. Methods of collecting statistical material	1	-	-	1
5.	Organization and planning of statistical research	-	2	2	4
6.	Compilation of statistical research programs	-	2	2	4
7.	Relative values. Key rules of probability	-	2	2	4
8.	Graphic methods of analysis	-	2	2	4
9.	Average values. Measurement of central tendency. Indicators of variation	-	2	2	4
10.	Method of standardization	-	2	2	4
11.	Assessment of the probability of research results	1	-	-	1
12.	Characteristics and analysis of statistical errors	1	-	-	1
13.	Parametric methods of probability estimation	-	2	2	4
14.	Non-parametric methods of probability estimation	-	2	2	4
15.	Correlation-regression analysis	-	2	2	4
16.	Dynamics series and their analysis	-	2	2	4
17.	Epidemiological studies in health care, their classification. Empirical and experimental studies	1	-	-	1
18.	Characteristics of experimental research. Randomized clinical trials are the "gold standard" of conducting research	1	-	-	1
19.	Design of epidemiological studies: case-control, cohort, randomized clinical trials	-	2	2	4
20.	Screening tests: characteristics and basic requirements. Concept of sensitivity and specificity	1	-	-	1
21.	Concept of risk factors. Indicators of risk factors	1	-	-	1
22.	Risk factors. Methodology for calculating risk indicators and their assessment	-	2	2	4
23.	Screening. Methodology for assessing the sensitivity and specificity of screening tests	-	2	2	4
24.	Overview of modern methods of statistical analysis (dispersion, multivariate, cluster)	1	-	-	1
25.	Statistical research software (packages of statistical data processing programs)	1	-	-	1
26.	Information provision of epidemiological and clinical studies	1	-	-	1
27.	Generalization of statistical research results. Systematic reviews and meta-analysis	1	-	-	1
28.	Medical statistics, the role in the analysis of population health and the activity of the health care system	1	-	-	1
29.	Accounting documentation. Electronic document management	1	-	-	1

30.	Databases on population health	1	-	-	1
31.	Organization and conduct of statistical research in public health	1	-	-	1
32.	Use of biostatistics knowledge in the daily practice of a doctor	1	-	-	1
33	The order of presentation of scientific works: design, publication, speech, presentation	1	-	-	1
34	Basics of preparing a scientific publication	-	2	2	4
35	Final control	-	2	6	8
	Implementation of S.S.	-	-	6	6
	In total	**20**	**30**	**40**	**90**

Note: L-lectures, PR - practical classes, S.S. - independent work of students

5. THEMATIC PLAN OF LECTURES

No	Topic names	Number of hours
1.	Social medicine and public health as a science	1
2.	Biostatistics as a methodological basis for analysis and evaluation of the health of the population and the health care system. Basics of evidence-based medicine	1
3.	Methodological foundations of the organization of statistical research	1
4.	Data types. Methods of collecting statistical material	1
5.	Assessment of the probability of research results	1
6.	Characteristics and analysis of statistical errors	1
7.	Epidemiological studies in health care, their classification. Empirical (descriptive and analytical) studies	1
8.	Characteristics of experimental research. Randomized clinical trials are the "gold standard" of conducting research	1
9.	Screening tests: characteristics and basic requirements. Concept of sensitivity and specificity	1
10.	Concept of risk factors. Indicators of risk factors	1
11.	Overview of modern methods of statistical analysis (dispersion, multivariate, cluster)	1
12.	Statistical research software (packages of statistical data processing programs)	1
13.	Information provision of epidemiological and clinical studies	1
14.	Generalization of statistical research results. Systematic reviews and meta-analysis	1
15.	Medical statistics, the role in the analysis of population health and the activity of the health care system	1
16.	Accounting documentation. Electronic document management	1
17.	Databases on population health	1
18.	Organization and conduct of statistical research in public health	1
19.	Use of biostatistics knowledge in the daily practice of a doctor	1
20.	The order of presentation of scientific works: design, publication, speech, presentation	1
	In total	**20**

6. THEMATIC PLAN OF SEMINAR LESSONS

Seminar classes are not provided for in the curriculum.

7. THEMATIC PLAN OF PRACTICAL LESSONS

No	Topic names	Number of hours
1.	Organization and planning of statistical research	2
2.	Compilation of statistical research programs	2
3.	Relative values. Key rules of probability	2
4.	Graphic methods of analysis	2
5.	Average values. Measurement of central tendency. Indicators of variation	2
6.	Method of standardization	2
7.	Parametric methods of probability estimation	2
8.	Non-parametric methods of probability estimation	2
9.	Correlation-regression analysis	2
10.	Dynamics series and their analysis	2
11.	Design of epidemiological studies: case-control, cohort, randomized clinical trials	2
12	Risk factors. Methodology for calculating risk indicators and their assessment	2
13.	Screening. Methodology for assessing the sensitivity and specificity of screening tests.	2
14.	Basics of preparing a scientific publication	2
15.	**Final modular control**	**2**
	In total per module	**30**

8. THEMATIC PLAN OF LABORATORY LESSONS
Laboratory classes are not included in the curriculum.

9. THEMATIC PLAN OF INDEPENDENT WORK OF STUDENTS

No	Topic names	Number of hours
1.	Theoretical preparation for practical classes	28
1.1.	Organization and planning of statistical research	2
1.2.	Compilation of statistical research programs	2
1.3.	Relative values. Key rules of probability	2
1.4.	Graphic methods of analysis	2
1.5.	Average values. Measurement of central tendency. Indicators of variation	2
1.6.	Method of standardization	2
1.7.	Parametric methods of probability estimation	2
1.8.	Non-parametric methods of probability estimation	2
1.9.	Correlation-regression analysis	2
1.10.	Dynamics series and their analysis	2
1.11.	Design of epidemiological studies: case-control, cohort, randomized clinical trials	2
1.12.	Risk factors. Methodology for calculating risk indicators and their assessment	2
1.13.	Screening. Methodology for assessing the sensitivity and specificity of screening tests.	2
1.14	Basics of preparing a scientific publication	2
2.	Performance of students' independent work "Implementation of evidence medicine into practical activity"	6
3.	Preparation for the final control	6
	In total per module	**40**

Note. According to the initial program, students are not expected to master individual topics independently (given the wide range of topics of lectures and practical classes, a significant number of hours, especially

lectures, and the complexity of the material). Therefore, the majority of hours for independent work are devoted to theoretical preparation for practical classes.

10. INDIVIDUAL TASKS
Individual lessons are not provided for in the curriculum.

11. PRACTICAL SKILLS
Acquiring practical skills is not provided for in the curriculum.

12. INDIVIDUAL TASKS
FOR STUDENTS TO PERFORM INDEPENDENT WORK
1. Maternal mortality as an important indicator of population health: main causes and trends in Ukraine.

2. Modern characteristics of infectious disease in the population of Ukraine: main trends and problems. HIV and AIDS in Ukraine: current situation, ways to overcome problems.

3. Emergency situations in the field of public health. Bioterrorism.

4. Analysis of the dynamics of tuberculosis incidence in the population in Ukraine: main trends and problems.

5. Modern characteristics of the incidence of diseases of the circulatory system in the population of Ukraine: causes and consequences of modern trends.

6. Modern characteristics of the incidence of malignant neoplasms in the population of Ukraine: causes and consequences of modern trends.

7. Tobacco, alcohol and drug use is a social and medical problem of society: the situation in Ukraine and ways to solve it.

8. Analysis of the dynamics of diabetes incidence in Ukraine: main trends and problems.

9. Analysis of the dynamics of injury indicators in Ukraine and the countries of the world. Features and types of traumatization of children and adults.

10. The state of health of the population affected by the accident at the Chernobyl nuclear power plant - current trends.

11. Prevention and intersectoral cooperation in the public health system.

12. Characteristics of a person's lifestyle and its components. Influence of lifestyle, behavioral risk factors on the health of the population of Ukraine.

13. Characteristics of the state of the environment and its components. The influence of environmental factors on the health of the population of Ukraine. Ecological public health.

14. Health promotion. Informational and explanatory activities (advocacy) as a component of medical prevention.

15. April 7 - World Health Day: slogan of the current year, events held to celebrate World Health Day in the world and in Ukraine.

Performing independent work by students involves the preparation of a presentation on this topic with a mandatory performance (defense of the work) at a practical session.

13. TEACHING METHODS
1. Verbal (lecture, explanation, story, conversation, instruction).

2. Visual (observation, illustration, demonstration).

3. Practical (various types of exercises, performing graphic works, carrying out an experiment, practice).

teaching methods are also used during the educational process :

explanatory-illustrative or information-receptive , which involves the presentation of ready-made information by the teacher and its assimilation by students;

reproductive , which is based on the performance of various tasks according to the model;

method of problem presentation , which consists in the fact that the teacher poses a problem and solves it himself, demonstrating the contradictions that characterize the learning process, while the students' task is to control the sequence of presentation of the material, the materiality of the evidence, predicting the next steps of the teacher; this method is implemented by training students in problem situations with the aim of successful preliminary preparation for future work in real conditions of practical medical institutions;

partially search or heuristic , aimed at mastering individual elements of search activity, for example: the teacher formulates a problem, students - a hypothesis;

research , the essence of which is the teacher's organization of students' search and creative activity by posing new problems and problematic tasks;

methods that ensure perception and assimilation of knowledge by students (lectures, independent work, instruction, consultation);

methods of applying knowledge and acquiring and consolidating abilities and skills (practical classes, control tasks);

methods of checking and evaluating knowledge , abilities and skills.

14. CONTROL METHODS

Preliminary (incoming) control serves as a means of identifying the existing level of knowledge of students for their use by the teacher in a practical session as orientation in the complexity of the material. It is conducted in order to assess the strength of knowledge and to determine the degree of perception of new educational material.

Current control - control of independent work of students regarding the study of educational materials. It is carried out at each practical lesson in accordance with the specific goals of the topic in order to check the degree and quality of mastering the studied material. In all practical classes, objective control of theoretical preparation and mastering of practical skills is applied in order to check the student's readiness for the class. In the process of ongoing control, the student's independent work is evaluated in terms of the completeness of tasks, the level of assimilation of educational materials, mastering of practical skills of analytical and research work, etc.

Boundary (thematic) control mastering the chapter (subchapter) takes place after completing the study of the block of relevant topics through testing and/or oral interview and/or performance of structured tasks. Thematic control is an indicator of the quality of studying the topics of the discipline's sections and students' assimilation of practical skills, as well as the related cognitive, methodical, psychological and organizational qualities of students. It is held in a specially designated - final - session.

Intermediate control consists in evaluating students' assimilation of educational material on the basis of their performance of certain types of work in practical (seminar) classes for a certain period. It is conducted in the form of a semester credit at the last practical (seminar) class in the semester.

Final control performs a control function, is carried out for the purpose of evaluating the results of training at a certain educational and qualification level or at individual completed stages. It is conducted in the form of a test, a differentiated test or an exam in order to establish the content of students' knowledge in terms of volume, quality and depth,

as well as the ability to apply them in practical activities. During the final control, the results of the completion of all types of educational work according to the structure of the work program are taken into account.

15. CALCULATION SCHEME AND DISTRIBUTION OF POINTS

During the assessment of mastery of each topic for the current educational activity, the student is given grades on a 4-point (national) grading scale. At the same time, all types of work provided for by the discipline program are taken into account. The student must receive a grade in each topic. Estimates given on a traditional scale are converted into points. The final grade for the current educational activity is recognized as an arithmetic average (the sum of grades for each class is divided by the number of classes in the semester) and is converted into points according to table 1.

The maximum number of points that a student can score for the current educational activity for admission to the exam is 120 points.

The minimum number of points that a student must score for the current educational activity for admission to the exam is 72 points. The calculation of the number of points is carried out on the basis of the grades received by the student on a 4-point (national) scale during the study of the discipline, by calculating the arithmetic mean (CA), rounded to two decimal places.

Table 1

Recalculation of the average grade
for current activity in a multi-point scale

4-point scale	200-point scale	4-point scale	200-point scale	4-point scale	200-point scale	4-point scale	200-point scale
5	200	4.47	179	3.94	158	3.42	137
4.97	199	4.45	178	3.92	157	3,4	136
4.95	198	4.42	177	3.89	156	3.37	135
4.92	197	4.4	176	3.87	155	3.35	134
4.9	196	4.37	175	3.84	154	3.32	133
4.87	195	4.35	174	3.82	153	3.3	132
4.85	194	4.32	173	3.79	152	3.27	131
4.82	193	4.3	172	3.77	151	3.25	130
4.8	192	4.27	171	3.74	150	3.22	129
4.77	191	4.24	170	3.72	149	3.2	128
4.75	190	4.22	169	3.7	148	3.17	127
4.72	189	4.19	168	3.67	147	3.15	126
4.7	188	4.17	167	3.65	146	3.12	125
4.67	187	4.14	166	3.62	145	3.1	124
4.65	186	4.12	165	3.6	144	3.07	123
4.62	185	4.09	164	3.57	143	3.05	122
4.6	184	4.07	163	3.55	142	3.02	121
4.57	183	4.04	162	3.52	141	3	120
4.55	182	4.02	161	3.5	140	Less than 3	Not enough
4.52	181	3.99	160	3.47	139		
4.5	180	3.97	159	3.45	138		

Assessment of individual student tasks.

Points for individual tasks are awarded only under conditions of their successful completion and defense. The number of points awarded for different types of individual tasks depends on their volume and importance, but no more than 10-12 points. They are added to the sum of points scored by the student in classes during the current educational activity. In no case can the total amount for the current activity exceed 120 points.

Assessment of students' self study work.

Students' independent work, which is provided for by the topic of the lesson along with classroom work, is evaluated during the current control of the topic in the corresponding lesson. The mastery of topics that are presented only for independent work is checked during the final module control.

The maximum number of points that a student can score during the exam is 80 points.

The evaluation of the final control is considered passed if the student scored at least 60% of the maximum number of points (for a 200-point scale – at least 50 points).

Determining the number of points a student has scored in a discipline: the number of points a student has scored in a discipline is determined as the sum of points for the current educational activity and for the final control (exam).

Conversion of the number of points from the discipline into grades on the ECTS scale and on the four-point (traditional) scale

Subject scores are independently converted to both the ECTS scale and the national assessment scale, but not vice versa (table 2).

Table 2

Recalculation of the average grade
for current activity in a multi-point scale

4-point scale	120-point scale	4-point scale	120-point scale	4-point scale	120-point scale	4-point scale	120-point scale
5	120	4.45	107	3.91	94	3.37	81
4.95	119	4.41	106	3.87	93	3.33	80
4.91	118	4.37	105	3.83	92	3.29	79
4.87	117	4.33	104	3.79	91	3.25	78
4.83	116	4.29	103	3.74	90	3.2	77
4.79	115	4.25	102	3.7	89	3.16	76
4.75	114	4.2	101	3.66	88	3.12	75
4.7	113	4.16	100	3.62	87	3.08	74
4.66	112	4.12	99	3.58	86	3.04	73
4.62	111	4.08	98	3.54	85	3	72
4.58	110	4.04	97	3.49	84	Less than 3	Not enough
4.54	109	3.99	96	3.45	83		
4.5	108	3.95	95	3.41	82		

Evaluation criteria
according to the traditional 4-point and ECTS scale

Score in points	Rating by national scale	Rating according to the ECTS scale
180-200	Perfectly	A
160-179	Fine	B
150-159		C
130-149	Satisfactorily	D
120-129		E
50-119	Unsatisfactorily	FX
0-49		F

Evaluation criteria.

During the evaluation of the mastery of each topic for the current educational activity, the higher education applicant is given grades according to the national (traditional) scale, taking into account the approved evaluation criteria:

grade "excellent" (5) - the student flawlessly mastered the theoretical material of the topic of the lesson, demonstrates deep and comprehensive knowledge of the relevant topic, the main provisions of scientific primary sources and recommended literature, thinks logically and constructs an answer, freely uses the acquired theoretical knowledge when analyzing practical material, expresses his attitude to certain problems, demonstrates a high level of assimilation of practical skills;

grade "good" (4) - the student has well mastered the theoretical material of the lesson, has the main aspects from primary sources and recommended literature, presents it in a reasoned way; possesses practical skills, expresses his thoughts on certain problems, but certain inaccuracies and errors are assumed in the logic of the presentation of theoretical content or in the performance of practical skills;

grade "satisfactory" (3) - the student has basically mastered the theoretical knowledge of the subject, orients himself in primary sources and recommended literature, but answers unconvincingly, confuses concepts, additional questions cause the student uncertainty or lack of stable knowledge; when answering questions of a practical nature, reveals inaccuracies in knowledge, does not know how to evaluate facts and phenomena, connect them with future activities, makes mistakes when performing practical skills;

rating "unsatisfactory" (2) - the student has not mastered the educational material of the topic, does not know scientific facts, definitions, hardly orients himself in primary sources and recommended literature, lacks scientific thinking, practical skills are not formed.

Estimates given on a traditional scale are converted into points. The minimum number of points that a student must score for the current academic activity per semester for admission to the exam is 120 points.

16. CONCLUSION QUESTIONS
MODULAR CONTROL

1. Theory and concept of statistical observation, stages of its implementation.
2. Design of clinical and epidemiological studies.
3. Sources of statistical information.
4. Grouping of statistical data.
5. Statistical tables, their characteristics, types, construction rules.
6. Selective observation as a source of statistical information.
7. Types of statistical monitoring of time and completeness of accounting.
8. Methods of collecting statistical material.
9. Absolute data. Types of relative values.
10. Graphical methods of data analysis. Types of diagrams, rules for their construction.
11. Average values in clinical and epidemiological studies, their types, practical significance, calculation methods.
12. The concept of variation, its meaning. Variability of population parameters, assessment methods.
13. Assessment of the probability of research results. Parametric criterion for assessing the probability of the Student.
14. Justification of cases of use of non-parametric methods of probability estimation. The concept of connected and independent aggregates.
15. Functional and correlational relationship. Types of correlation coefficients.
16. Regression analysis, regression coefficient, regression equation.
17. Methods of standardization, stages of the direct method of standardization.
18. Basic rules of construction and analysis of dynamic series. Methods of equalizing dynamic series, concepts of extrapolation and interpolation.
19. Concept of risk in epidemiological studies. The main risk factors affecting health.
20. Risk indicators, odds ratio indicator, calculation and evaluation method.
21. Basic principles and provisions of clinical epidemiology. Hierarchy of clinical research evidence.
22. Concept of null hypothesis. Statistical hypothesis testing. Errors of the first and second kind.
23. Screening. Basic characteristics of screening tests. Specificity and sensitivity of the screening test.
24. Empirical and experimental epidemiological studies. The "gold standard" of research.
25. Evidence-based medicine. History, main provisions, principles, areas of application.
26. Types of data. The concept of measurement scales.
27. The concept of systematic reviews and meta-analysis.
28. Subject and tasks of medical statistics. Organization of the medical statistics service in Ukraine. Electronic document management.
29. Tasks of the information and analytical department of the health care institution. The concept of accounting and reporting documentation.
30. Basics of preparing a scientific publication

17. MEANS OF IMPLEMENTATION

CURRENT AND FINAL CONTROL

1. Test questions for topics of practical classes.
2. Test questions of the final module control.
3. List of theoretical questions for the final modular control.
4. Tasks for current control of knowledge.
5. Tasks for final control of knowledge.
6. List of tasks for independent work.
7. Lecture notes.
8. Study guide for practical classes.
9. Study guide for students' independent work.

18. RECOMMENDED LITERATURE

BASIC (MAIN):

1. Public health: textbook for students. higher med. education institutions - Kind. 3 - Vinnytsia: "New Book", 2018. - 560 p.
2. Oxford Textbook of Global Public Health, 6th edition. Edited by Rogers Detels, Martin Gulliford, Quarraisha Abdool Karim and Chorh Chuan Tan. - Oxford University Press, 2018. - 1728 p.
3. Medical Statistics at a Glance Text and Workbook. Aviva Petria, Caroline Sabin. – Wiley-Blackwell, 2019. – 288 p.

AUXILIARY:

1. Board Review in Preventive Medicine and Public Health. Gregory Schwaid. - ELSEVIER., 2018. – 450 p.
2. Donaldson's Essential Public Health, Fourth Edition. Liam J. Donaldson, Paul Rutter - CRC Press, Taylor&Francis Group, 2018 - 374 p.
3. Jekel's epidemiology, biostatistics, preventive medicine and public health. Fourth edition. David L. Katz, Joann G. Elmore, Dorothea MG Wild, Sean C. Lucan. - ELSEVIER., 2019. - 405 p.
4. Oxford Handbook of Public Health Practice, Fourth Edition. Charles Guest, Walter Ricciardi, Ichiro Kawachi, Iain Lang. - Oxford University Press, 2018. - 656 p.
5. Primer of Biostatistics, Seventh Edition. Stanton A. Glantz - McGraw-HillEducation, 2018. - 320 p.
6. Albom A., Norell S. Introduction to modern epidemiology. - Tallinn, 2020. - 122 p.
7. Biostatistics. - K.: Book plus; 2019. – 184 p.
8. Vlasov V.V. Introduction to evidence-based medicine. - M.: Media Sphere, 2019. - 392 p.
9. Glanz S. Medical and biological statistics. - M.: Practice, 2020. - 459 p.
10. Grynhalkh T. Fundamentals of evidence-based medicine: trans. with English - M.: GEOTAR-MED, 2019. - 240 p.
11. Epidemiological methods of studying non-infectious diseases / V.M. Lekhan, Yu.V. Voronenko, O.P. Maksymenko et al. - D.: ART-PRESS, 2018. - 184 p.
12. Collection of test tasks for state tests in hygiene, social medicine, organization and economics of health care. Education manual. – Vinnytsia: New Book, 2019 – 200 p.
13. Methods of social medicine / under the editorship. OHM. Ocheredko, O.H. Protsek – Vinnytsia: Thesis, 2018. – 410 p.

14. Handbook of social medicine and health care organization. - K.: "Health", 2020. - 359 p.

15. Program test questions on social medicine and health care organization. – Ternopil: Ukrmedknyga, 2018. – 316 p.

16. Social medicine and organization of health care (for students of stomatological faculties of higher medical educational institutions of Ukraine IV level of accreditation. - K.: Kniga plus, 2019. - 328 p.

17. Fletcher R., Fletcher S., Wagner E. Clinical epidemiology. Fundamentals of evidence-based medicine. - M.: Media Sphere, 2020. - 352 p.

18. Annual report on the state of health of the population, the sanitary-epidemic situation and the results of the health care system of Ukraine. 2016 / Ministry of Health of Ukraine, State University "UISD of Ministry of Health of Ukraine". - Kyiv, 2017. - 516 p.

INFORMATION RESOURCES

1. World Health Organization www.who.int.

2. European database "Health for all" www.euro.who.int/ru/home.

3. Cochrane Center for Evidence-Based Medicine www.cebm.net.

4. Cochrane Library www.cochrane.org .

5. US National Library of Medicine - MEDLINE www.ncbi.nlm.nih.gov/PubMed .

6. Canadian Center for Evidence in Health www.cche.net .

7. Center for Disease Control and Prevention www.cdc.gov .

8. Public Health Center of the Ministry of Health of Ukraine www.phc.org.ua.

9. Ukrainian database of medical and statistical information "Health for all": http://medstat.gov.ua/ukr/news.html?id=203 .

10. British Medical Journal www.bmj.com .

11. Journal of Evidence-Based Medicine www.evidence-basedmedicine.com.