MINISTRY OF HEALTH OF UKRAINE
BUKOVINIAN STATE MEDICAL UNIVERSITY

APPROVE
Vice-Rector of a higher education establishment
on scientific and pedagogical work
Volodymyr KHODOROVSKYY
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30 ____08____ 2024

STUDENT GUIDE
(SYLLABUS)
of studying the discipline

SOCIAL MEDICINE, PUBLIC HEALTH

Field of knowledge	22 Healthcare
Specialty	222 «Medicine»
Educational degree	«Master of Medicine»
Course of study	III
Form of study	full-time
Department	Department of Social Medicine and Public Health

Approved at the methodical meeting of the department of Social Medicine and Public Health «29» August 2024 (protocol №2).

Head of the Department of Social Medicine and Public Health _____ Ihor NAVCHUK

Approved by the subject methodical commission on disciplines of hygienic profile «30» August 2024 (protocol № 1).

Chairman of the subject methodical Commission _____ Svyatoslav DEINEKA

Chernivtsi – 2024

1. GENERAL INFORMATION ABOUT SCIENTIFIC AND PEDAGOGICAL WORKERS WHO TEACH THE DISCIPLINE

Department	Department of Social Medicine and Public Health
Surname, name, patronymic of scientific and pedagogical workers, position, scientific degree, academic title, e-mail	1. Biduchak A. S.- Candidate of Medical Sciences, Associate Professor, biduchak.anzhela@bsmu.edu.ua 2. Vlasyk L. Y. - Candidate of Medical Sciences, Associate Professor, vlasyk.lyubov@bsmu.edu.ua 3. Chornenka Zh. A.- Candidate of Medical Sciences, Associate Professor, chornenka.zhanetta@bsmu.edu.ua 4. Yasynska E. Th. - Candidate of Medical Sciences, Associate Professor, yasynska.elvira@bsmu.edu.ua 5. Domanchuk T. Il. - Candidate of Medical Sciences, AssociateProfessor, domanchuk.tetyana@bsmu.edu.ua 6. Hopko N. V. - Candidate of Medical Sciences, Associate Professor, gopkonv@gmail.com
Web page of the department on the official website of the university	https://www.bsmu.edu.ua/sotsialnoyi-meditsini-ta-ooz/
Website of the department	http://ozo.bsmu.edu.ua/
E-mail	ozo@bsmu.edu.ua
Street address	Fedkovycha, 16
Contact phone	-

2. GENERAL INFORMATION ABOUT THE COURSE

The status of the discipline is	Normative
Number of credits	3,0
The total number of hours	90
Lectures	20
Practical classes	30
Independent work	40
Type of final control	final module control

3. DESCRIPTION OF THE COURSE (ABSTRACT)

The educational discipline "Social medicine, public health" is basic and refers to the professional training of a student of higher education in the specialty 222 "Medicine" and involves the mastery of biostatistics as a science, the definition and analysis of basic biostatistical indicators and criteria based on the principles of evidence-based medicine.

The subject of study of the academic discipline is modern principles of evidence-based medicine, theoretical and methodological foundations of biostatistics.

4. POLICY OF THE COURSE

4.1. List of normative documents:

- Regulations on the organization of the educational process (https://www.bsmu.edu.ua/wp-content/uploads/2020/03/polozhennya-pro-organizacziyu-osvitnogo-proczesu-u-vdnzu-bukovinskij-derzhavnij-medichnij-universitet .pdf);
- Instructions for assessing the educational activities of BSMU students in the implementation of the European credit transfer system of the educational process (https://www.bsmu.edu.ua/wp-content/uploads/2020/03/bdmu-instrukcziya-shhodo-oczinyuvannya- % D1% 94kts-2014-3.pdf);
- Regulations on the procedure for working off missed and uncredited classes (https://www.bsmu.edu.ua/wp-content/uploads/2019/12/reworks.pdf);

- Regulations on the appeal of the results of the final control of knowledge of applicants for higher education (https://www.bsmu.edu.ua/wp-content/uploads/2020/07/polozhennya-pro-apelyacziyu-rezultativ-pidsumkovogo-kontrolyu-znan.pdf) ;

- Code of Academic Integrity (https://www.bsmu.edu.ua/wp-content/uploads/2019/12/kodeks_academic_faith.pdf);

- Moral and ethical code of students (https://www.bsmu.edu.ua/wp-content/uploads/2019/12/ethics_code.docx);

- Regulations on the prevention and detection of academic plagiarism (https://www.bsmu.edu.ua/wp-content/uploads/2019/12/antiplagiat-1.pdf);

- Regulations on the procedure and conditions for students to choose elective courses (https://www.bsmu.edu.ua/wp-content/uploads/2020/04/nakaz_polozhennyz_vybirkovi_dyscypliny_2020.pdf);

- Rules of internal labor regulations of the Higher State Educational Institution of Ukraine "Bukovinian State Medical University" (https://www.bsmu.edu.ua/wp-content/uploads/2020/03/17.1-bdmu-kolektivnij-dogovir-dodatok.doc).

4.2. Policy on adherence to the principles of academic integrity of higher education students:

- independent performance of educational tasks of current and final controls without the use of external sources of information;

- write-offs during knowledge control are prohibited;

- independent performance of individual tasks and correct registration of references to sources of information in case of borrowing of ideas, statements, information.

4.3. Policy on adherence to the principles and norms of ethics and deontology by higher education students:

- actions in professional and educational situations from the standpoint of academic integrity and professional ethics and deontology;

- compliance with the rules of internal regulations of the university, to be tolerant, friendly and balanced in communication with students and teachers, medical staff of health care institutions;

- awareness of the importance of examples of human behavior in accordance with the norms of academic integrity and medical ethics.

4.4. Attendance policy for higher education students:

- Attendance at all training sessions (lectures, practical (seminar) classes, final modular control) is mandatory for the purpose of current and final assessment of knowledge (except for good reasons).

4.5. Deadline policy and completion of missed or uncredited classes by higher education students:

- missed classes are held according to the schedule of missed or uncredited classes and consultations.

5. PRECISIONS AND POST-REQUIREMENTS OF THE EDUCATIONAL DISCIPLINE (INTERDISCIPLINARY RELATIONS)

List of disciplines, on which the study is based academic discipline	List of academic disciplines, for which the basis is laid as a result of studying the discipline
Based on the study by students of such disciplines as the history of medicine, sociology and medical sociology, hygiene and ecology, statistics, computer science, ethics, the foundations of economic theory	Lays the foundations for studying the organization of the treatment and diagnostic process, as well as assessing its scope and quality when studying clinical disciplines; Public health Evidence-based medicine Therapy

6. PURPOSE AND TASKS OF THE COURSE:

6.1. *The purpose of studying* the academic discipline "Social medicine, public health" (module 1 Biostatistics) is to train specialists who would possess a sufficient amount of knowledge and skills to generalize and analyze medico-biological, clinical and statistical data.

6.2. The main tasks of studying the discipline are:

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

7. COMPETENCIES, THE FORMATION OF WHICH IS CONTRIBUTED BY THE COURSE:

7.1. Integral competence:

The ability to solve complex problems, including those of a research and innovation nature in the field of medicine. Ability to continue learning with a high degree of autonomy.

7.2. General competencies:

GC 1. Ability to abstract thinking, analysis and synthesis.
GC 2. The ability to learn and master modern knowledge.
GC 3. Ability to apply knowledge in practical situations.
GC 4. Knowledge and understanding of the subject field and understanding of professional activity.
GC 5. Ability to adapt and act in a new situation.
GC 6. Ability to make informed decisions.
GC 7. Ability to work in a team.
GC 8. Ability to interpersonal interaction.
GC 10. Ability to use information and communication technologies.
GC 11. Ability to search, process and analyze information from various sources.
GC 12. Determination and persistence in relation to assigned tasks and assumed responsibilities.
GC 13. Awareness of equal opportunities and gender issues.
GC 14. The ability to realize one's rights and responsibilities as a member of society, to be aware of the values of a civil (free democratic) society and the need for its sustainable development, the rule of law, the rights and freedoms of a person and a citizen in Ukraine
GC 16. Ability to make decisions and act in accordance with the principle of inadmissibility of corruption and any other manifestations of dishonesty.

7.3. Professional (special) competencies:

PC 6. Ability to determine the principles and nature of treatment and prevention of diseases.
PC 11. The ability to solve medical problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility, including the system of early intervention.
PC 16. Ability to maintain medical documentation, including electronic forms.
PC 17. Ability to assess the impact of the environment, socio-economic and biological determinants on the state of health of an individual, family, population.
PC 20. Ability to conduct epidemiological and medical-statistical studies of the health of the population; processing of social, economic and medical information.
PC 21. Clearly and unequivocally convey one's own knowledge, conclusions and arguments on health care problems and related issues to specialists and non-specialists, in particular to people who are studying.
PC 24. Compliance with ethical principles when working with patients and laboratory animals.
PC 25. Observance of professional and academic integrity, bear responsibility for the reliability of the obtained scientific results.

8. LEARNING OUTCOMES.

As a result of studying the discipline the applicant must:

8.1. *To know:*

- definition of biostatistics as an educational discipline and its role in the system of evidence-based medicine;
- theoretical and methodological foundations of biostatistics;
- the main organizational elements of statistical research, its methodical and practical aspects;
- basic approaches and indicators for characterizing statistical populations and evaluating data in dynamics;
- methodological foundations and criteria for choosing the main adequate methods of analysis for testing statistical hypotheses.

8.2. *Able:*

- evaluate and analyze statistical indicators and parameters of statistical aggregates.
- acquire the skills and abilities to form statistical hypotheses;
- analyze and evaluate statistical models according to their main characteristics and indicators;
- acquire practical knowledge, abilities and skills in using applied methods of biostatistics for data analysis;
- to master the theoretical and methodical bases of analysis of statistical results, their evaluation and description in order to form reasonable conclusions.

8.3. *Demonstrate:*

- mastery of the methodology of application of standards of medical technologies in practical activities.

9. PROGRAM OUTCOMES OF LEARNING

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

POL 1. Have thorough knowledge of the structure of professional activity. To be able to carry out professional activities that require updating and integration of knowledge. To be responsible for professional development, the ability for further professional training with a high level of autonomy.

POL 3. Specialized conceptual knowledge, including scientific achievements in the field of health care and is the basis for conducting research, critical understanding of problems in the field of medicine and related interdisciplinary problems, including the system of early intervention.

POL 18. To determine the state of functioning and limitations of a person's vital activity and the duration of incapacity for work with the preparation of relevant documents, in the conditions of a health care institution, based on data about the disease and its course, peculiarities of a person's professional activity, etc. Maintain medical documentation regarding the patient and the contingent of the population on the basis of regulatory documents.

POL 19. To plan and implement a system of anti-epidemic and preventive measures regarding the occurrence and spread of diseases among the population.

POL 20. Analyze the epidemiological situation and carry out mass and individual, general and local prevention of infectious diseases.

POL 21. Search for the necessary information in the professional literature and databases of other sources, analyze, evaluate and apply this information.

POL 22. Apply modern digital technologies, specialized software, statistical methods of data analysis to solve complex health care problems.

POL 23. Assess the impact of the environment on the state of human health to assess the state of morbidity of the population.

POL 25. It is clear and unambiguous to convey one's own knowledge, conclusions and arguments on health care problems and related issues to specialists and non-specialists.

POL 26. Manage work processes in the field of health care, which are complex, unpredictable and require new strategic approaches, organize work and professional development of personnel taking

into account the acquired skills of effective teamwork, leadership positions, adequate quality, accessibility and fairness, ensuring provision of integrated medical care.
POL 28. Make effective decisions on health care issues, evaluate the necessary resources, take into account social, economic and ethical consequences.8.2. Thematic structure of the module (content modules).

10. INFORMATION VOLUME OF THE EDUCATIONAL DISCIPLINE

Description of each discipline module:
The discipline is studied in the 3rd year, 90 hours of 3 ECTS credits* are allocated to the study of the academic discipline.

Structure of the academic discipline	Number of hours, of which				Year of study
	hours/ ECTS credits	classrooms		Student's Independent Work	
		lectures	practical classes		
Module 1. Biostatistics	90 / 3	20	30	40	3-й
Total	**90 / 3**	**20**	**30**	**40**	

*Note: 1 ECTS credit – 30 hours

MODULE 1. BIOSTATISTICS

Content module 1. Methodology of statistical research.

Topic 1. Social medicine and public health as a science. Biostatistics as a methodological basis for the analysis and assessment of the health of the population and the health care system.

Social medicine and public health is a science that studies the patterns of public health and the system of its protection. 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 the quality of medical care. Standardization of medical care: clinical protocols, standards and recommendations.

Topic 2. Methodological foundations of the organization of statistical research. Data types. Methods of collecting statistical material.

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

Topic 3. 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. Research object, observation unit. Types of research by scope: 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 4. 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 5. Relative values. Graphic methods of analysis.

Concept of statistical indicators, their types, form of presentation. Absolute data, relative values, their practical significance. Types of relative values (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.

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

Topic 6. Series of dynamics and their analysis.

Basic rules of construction and analysis of dynamic series when studying the dynamics of medical and biological phenomena. Levels of the series. 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 7. Average values and 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 8. Assessment of the probability of research results. Characteristics and analysis of statistical errors.

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. Error of the 1st and 2nd kind. Typical mistakes at the stages of conducting research. Random and systematic error. 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 9. 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 the difference: Student's t-test, calculation method, its evaluation. Peculiarities of use on small samples. Student table.

Topic 10. 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 estimation - Spearman's rank correlation coefficient. Pair and multiple correlation coefficients. Regression analysis, regression coefficient, regression equation. Using regression analysis for forecasting.

Topic 11. 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 12. 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.

Content module 2. Methodology of epidemiological research.

Topic 13. Epidemiological studies in health care, their classification. Empirical and experimental studies.

Modern concept of epidemiology. Classification of epidemiological studies. Comparative characteristics of various types of research, evaluation 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 14. 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 15. The concept of risk factors. Screening tests: characteristics and basic requirements.

Prognostic factors and risk factors, their significance 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 in a cohort study: method of calculation and assessment.

Screening. Assessment of screening results. Requirements for screening tests. Sensitivity and specificity of the screening test. Relationship between sensitivity and specificity. The concept of ROC analysis.

Topic 16. Risk factors. Methodology for calculating risk indicators and their assessment.

Risk factors. Risk indicators: absolute, relative and additional population risk. Odds. Odds ratio indicator. Method of calculation and assessment.

Topic 17. 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 18. Overview of modern methods of statistical analysis (dispersion, multivariate, cluster).

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

Topic 19. Information provision of epidemiological and clinical studies. Systematic reviews and meta-analysis.

Medical information: its components, information search problems. Databases of literature, medical libraries. Generalization of clinical research results. Analytical reviews. The concept of meta-data. Systematic reviews and meta-analysis. Cochrane Collaboration: history of creation and activity.

Topic 20. Medical statistics, the role in the analysis of the health of the population and the activity of the health care system. Electronic document management.

Medical statistics: theoretical foundations, subject and content, tasks, sections. Principles of construction and activity of the Medical and Statistical Service of Ukraine. Center for Medical Statistics. Information flows in the system of medical statistics. Accounting documentation. Activities of information and analytical departments of health care institutions. The concept of electronic document management in health care.

Topic 21. Databases on population health. Organization and conduct of statistical research in public health.

Population health databases (European and national Health for All databases): design, filling, features. Research activity in public health in Ukraine and abroad.

Topic 22. Basics of evidence-based medicine.

The history of evidence-based medicine, the main concepts, principles, provisions of evidence-based medicine, the concept of the quality of clinical research, the relationship between evidence-based medicine and the quality of medical care.

Topic 23. Use of biostatistics knowledge in the daily practice of a doctor. Statistical research software and the procedure for presenting scientific works.

The place and role of biostatistics in medical education and the work of a practicing physician. Overview of the main statistical data processing packages (Excel, Access, Statistica, Stata, SPSS, SAS): advantages, disadvantages, the possibility of access, mastery problems. Types of scientific works (thesis, article, methodological recommendations, monograph, textbook, dissertation). The order of presentation of scientific works: design, publication, performance, presentation.

Topic 24. Basics of preparing a scientific publication.

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 links to sources of information, list of literature.

Topic 25. Final modular control.

Performing independent student work (SIW)

One topic is offered for the implementation of SIW: Implementation of evidence-based medicine in clinical practice (using the example of a separate clinical discipline) or conducting independent scientific research in any field of medicine (human anatomy, internal medicine, hygiene, pharmacology, etc.) and presenting its results in the form of SIW.

List of questions to the final modular control № 1 BIOSTATISTICS

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 Student's probability.
14. Justification of cases of use of non-parametric methods of probability estimation. The concept of connected and independent sets.
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. Major 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. The 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.

11. STRUCTURE OF THE COURSE

Names of content modules and topics	Total	Classroom		Independent work of student
		Lectures	Practical classes	
1	2	3	4	5
Topic 1 Social medicine and public health as a science. Biostatistics as a methodological basis for the analysis and assessment of the health of the population and the health care system.	2	2		
Topic 2. Methodical bases of the organization of statistical researches. Data types. Methods of collecting statistical material	2	2		
Topic 3 Organization and planning of statistical research	4		2	2
Topic 4 Compilation of statistical research programs.	4		2	2
Topic 5 Relative values. Graphic methods of analysis.	4		2	2
Topic 6 Time series and their analysis.	4		2	2
Topic 7 Average values and indicators of variation.	4		2	2
Topic 8 Estimation of reliability of research results. Characteristics and analysis of statistical errors.	2	2		
Topic 9. Parametric methods of probability estimation.	4		2	2
Topic 10 Correlation-regression analysis.	4		2	2
Topic 11 Method of standardization.	4		2	2
Topic 12 Non-parametric methods of probability estimation	4		2	2
Together on the content module 1	**42**	**6**	**18**	**18**
Topic 13. Epidemiological studies in health care, their classification. Empirical and experimental studies.	2	2		
Topic 14. Design of epidemiological studies: case-control, cohort, randomized clinical trials.	4		2	2
Topic 15. Concept of risk factors. Screening tests: characteristics and basic requirements.	2	2		
Topic 16. Risk factors. Methods of calculating risk indicators and their assessment	4		2	2
Topic 17. Screening. Methods for assessing the sensitivity and specificity of screening tests.	4		2	2
Topic 18. Review of modern methods of statistical analysis (variance, multifactor, cluster)	2	2		
Topic 19. Information support of epidemiological and clinical research. Systematic reviews and meta-analysis.	2	2		

Topic 20. Medical statistics, the role in the analysis of public health and the health care system. Electronic document management	2	2		
Topic 21. Databases on public health. Organizing and conducting statistical surveys in public health.	2	2		
Topic 22. Fundamentals of evidence-based medicine	4		2	2
Topic 23. The use of knowledge of biostatistics in the daily practice of the doctor. Software of statistical researches and the order of presentation of scientific works.	2	2		
Topic 24. Basics of preparation of a scientific publication.	4		2	2
Together on the content module 2	**34**	**14**	**10**	**10**
Individual work	**6**			**6**
Final module control	**8**		**2**	**6**
Total	**90**	**20**	**30**	**40**

1. PLAN OF LECTURES

№	Name topics	Number of hours
1	Social medicine and public health as a science. Biostatistics as a methodological basis for analysis and assessment of public health and the health care system.	2
2	Methodical bases of the organization of statistical researches. Data types. Methods of collecting statistical material.	2
3	Estimation of reliability of research results. Characteristics and analysis of statistical errors.	2
4	Epidemiological studies in health care, their classification. Empirical and experimental studies.	2
5	The concept of risk factors. Screening tests: characteristics and basic requirements.	2
6	Review of modern methods of statistical analysis (variance, multifactor, cluster).	2
7	Information support of epidemiological and clinical research. Systematic reviews and meta-analysis.	2
8	Medical statistics, role in the analysis of public health and the health care system. Electronic document management.	2
9	Public health databases. Organizing and conducting statistical surveys in public health.	2
10	The use of knowledge of biostatistics in the daily practice of the doctor. Software of statistical researches and the order of presentation of scientific works.	2
	Total	**20**

2. THEMATIC PLAN OF PRACTICAL CLASSES

№	Name topics	Number of hours
1	Organization and planning of statistical surveys	2
2	Compilation of statistical research programs	2
3	Relative values. Graphic methods of analysis.	2
4	Time series and their analysis.	2
5	Average values and indicators of variation.	2
6	Parametric methods of probability estimation	2
7	Correlation-regression analysis.	2
8	Standardization method.	2
9	Nonparametric methods of probability estimation.	2
10	Design of epidemiological studies: case-control, cohort, randomized clinical trials.	2
11	Risk factors. Methods of calculating risk indicators and their assessment.	2
12	Screening. Methods for assessing the sensitivity and specificity of screening tests.	2

13	Fundamentals of evidence-based medicine	2
14	Basics of preparation of a scientific publication	2
15	Final modular control.	2
	Total	**30**

3. THEMATIC PLAN OF INDEPENDENT WORK

№	Name topics	Number of hours
1	Preparation for practical classes - theoretical training and development of practical skills.	28
2	Execution of SIW on the selected topic.	6
3	Preparation for the final module control.	6
	Total	**40**

***Note. According to this program in MODULE 1. "BIOSTATISTICS" students are not expected to master individual topics independently.**

15. LIST OF INDIVIDUAL TASKS.

It is expected to write a term paper on this discipline.

16. TOPICS OF INDIVIDUAL EDUCATIONAL AND RESEARCH TASKS

(search, research and analytical works)

List of topics:

1. Analysis of the stay in the surgical department of the hospital of patients with acute cholecystitis.
2. Analysis of the consequences of the disease in patients who were treated in a hospital for peptic ulcer disease.
3. Analysis of morbidity with temporary loss of working capacity due to hypertension.
4. Analysis of the organization of medical supervision of patients with bronchial asthma.
5. Analysis of the results of inpatient treatment of children with lymphogranulomatosis.
6. Analysis of the terms of inpatient treatment of children with rheumatism.
7. Analysis of the duration of inpatient treatment of children operated on for inguinal hernia.
8. Analysis of reasons for violation of vaccination deadlines in children of the first 3 years of life.
9. Analysis of reasons for untimely vaccination and revaccination of children against diphtheria, whooping cough, and tetanus.
10. Analysis of the incidence of temporary disability due to coronary heart disease.
11. Analysis of dental caries incidence among school-aged children.
12. Analysis of the length of stay in the surgical department of a hospital for patients with acute appendicitis.
13. Analysis of the causes of mortality among children in the first 3 years of life.
14. Analysis of morbidity with temporary loss of working capacity in connection with a fracture of the knee joint.
15. Analysis of the organization of medical supervision of patients with hemophilia.
16. Analysis of the incidence of purulent otitis among children from 3 to 14 years old.
17. Analysis of mortality among the working population.
18. Analysis of SARS incidence among children aged 2 to 5 years.
19. Analysis of mortality among the population over 56 years old.
20. Analysis of the stay in the pulmonology department of a hospital for patients with pneumonia.

17. LIST OF PRACTICAL TASKS AND WORKS FOR THE FINAL MODULAR CONTROL

Task 1.

Among the male population, including 6327 people, for N year the following diseases were registered: acute otitis 30; sore throat - 15; boils - 40; mastoditis - 16; others - 40. Total class -141. Calculate the intensive and extensive incidence rates and display the results graphically.

Task 2.

When studying the physical development of 9-year-old boys, the following data were obtained:

Chest circumference	Number of persons
56	15
57	11
58	14
59	19
60	20
61	14
62	11
63	6

Calculate the average value by the method of displacement and by the method of moments; rms ratio; coefficient of variation.

Task 3.

The following results were obtained when measuring blood pressure in 30-year-old men:

Pressure in mm Hg	Number of respondents
124	9
125	10
126	15
127	17
128	22
129	20
130	19
131	18

Determine the average blood pressure (by method of displacement and moments).

Task 4.

Calculate the regression coefficient of weight growth for 14-year-old girls, if the following data were obtained when processing the variation series: δy (weight) = 7.04; δx (growth) = 6.40; rxu = 0.72.

Task 5.

Among the population aged 18 - 19 years with a total number of 410 people in the city N for the year were registered 350 diseases, including:

1. Infectious diseases - 99.
2. Injuries - 36.
3. Diseases of the ear, throat, nose - 84.
4. Diseases of the digestive system - 23.

To determine the levels and structure of morbidity among the specified group of the population on the listed diseases.

Task 6.

Among the population aged 18 - 19 years with a total number of 410 people in the city N for the year were registered 350 diseases, including:

1. Infectious diseases - 99.
2. Injuries - 36.
3. Diseases of the ear, throat, nose - 84.
4. Diseases of the digestive system - 23.

To determine the levels and structure of morbidity among the specified group of the population on the listed diseases.

Task 7.
Carry out statistical processing of the time series. The presence of the number of beds in the hospital EMH.
2001 - 1850;
2002 - 1900;
2003 - 1700;
2004 - 1800.

Task 8.
Determine the results of treatment of patients in the hospital in the presence of the following data:
- discharged with recovery - 800 people;
- discharged with improvement - 400 people;
- discharged without changes - 80 people;
- died - 30 people;

A total of 13,100 people were treated. Name the synonyms of the extensive indicator.

Task 9.
Calculate the correlation coefficient, the error of the correlation coefficient, the reliability of the correlation.

City area	% of overcrowded apartments	Mortality from tuberculosis In areas of the city per 10,000 population
A	7	11.0
B	12	16.0
C	17	16.0
D	22	18.0
E	27	20.0
F	33	24.0
G	32	37.0

Task 10.
Calculate the coefficient of regression of weight by height and growth by weight, if it is known that 8-year-old boy's average height is 124.5 cm, average weight - 24.88 kg. ($r_{xy} = 0.74$; $\delta x = 5.32$; $\delta y = 2.96$).

Task 11.
Carry out statistical processing of the time series. Calculate birth rate change in the N district for 5 years.
2005 - 12%;
2006 - 15%;
2007 - 14%;
2008 - 16%;
2009 - 17% o.

Task №12
Among the male population of N., numbering 6000 people, for № year the following diseases were registered:

№	Name of the disease	Number of diseases	Indicators	
1.	Conjunctivitis	184	**Intensive per 1000 population**	**Extensive in%**
2.	Cataract	32		
3.	Glaucoma	6		
4.	Other	144		
	Total for class	366		

Calculate: intensive and extensive incidence rates and the results are displayed graphically.

Task 13.
Calculate the rank correlation coefficient, the error of the correlation coefficient, the probability of correlation.

Area of the city	% of overcrowded	Mortality from tuberculosis

	apartments	per 10,000 inhabitants
A	14	1
B	13	1
C	9	2
D	8	3
E	6	5
F	5	6
G	4	7
J	3	10
I	2	11

Task 14.

Calculate the average incidence of tuberculosis among the population in the city of N., if the indicators by district were as follows:

Areas	Morbidity (in%)	Number of population
A	0.8	70,000
B	0.9	70,000
C	0.7	60,000

Task 15.

When studying the percentage of hemoglobin in the blood of patients with hypertension, the following data were obtained:

% hemoglobin	Number of subjects
80	7
81	12
82	15
83	17
84	16
85	14
86	11
87	8

Determine the mean percentage of hemoglobin (by the method of mixing, as well as the standard deviation).

18. METHODS AND FORMS OF CONTROL

Current control is carried out at each practical lesson in accordance with the specific goals of the topic, as well as during individual work of the teacher with the student for those topics that the student works on independently and which are not included in the structure of the practical lesson. It is recommended to apply types of objective (standardized) control of theoretical and practical training of students.

The final module control is carried out at the end of the module study at the last practical session. Students who have completed all types of work prescribed by the curriculum and have scored at least the minimum number of points during the study of the discipline are admitted to the final examination.

FORM OF FINAL CONTROL OF LEARNING SUCCESS

The form of final control should be standardized and include control of theoretical and practical training. Specific forms of discipline control are defined in the work curriculum.

The maximum number of points of the final control is 80 points.

The final modular control is considered passed if the student has scored at least 50 points.

19. ASSESSMENT OF THE STUDENT'S LEVEL OF TRAINING IN THE DISCIPLINE

Control measures include current and final control.

The modular rating system for evaluating knowledge in the discipline "Social medicine, public health" (module 1 "Biostatistics") provides for the following forms of work and their evaluation:

When assessing the mastery of each topic of the module, the student is given grades on a four-point (traditional) scale, using the evaluation criteria accepted by BSMU and approved by the methodical commission. At the same time, all types of work provided for by methodical development for studying the topic are taken into account. The marks given on the traditional scale are converted into points depending on the number of topics in the module. The weightage of each topic in a module should be the same, but may vary between modules

The maximum number of points that a student can score while studying the module is calculated by multiplying the number of points (8) corresponding to the grade "5" by the number of topics (14) and is **120 points** (8 × 14 + 8 points for individual work = 120 points).

The minimum number of points that a student can score while studying the module is a **criterion for admission to the module final control** - it is calculated by multiplying the number of points (5) corresponding to the grade "3" by the number of topics in the module (14) and is **70 points**. Distribution of points by modules:

Traditional assessment	**Conversion into points**
	Module 1
«5»	8
«4»	6,5
«3»	5
«2»	0

Grades given on a traditional scale are converted into points, as an example, as follows:

Module number, number of study hours / number of ECTS credits	**Number of content modules, their numbers**	**Number of practical classes**	**Conversion into scores of traditional grades**					
			Traditional estimates				**Points for individual tasks**	**Minimum number of points ***
			"5"	**"4"**	**"3"**	**"2"**		
Module 1 90/3,0	2 (№ 1-2)	14	8	6,5	5	0	8	70

The minimum number of points that a student can obtain is calculated by multiplying the number of points corresponding to the grade "3" by the number of topics in the module. A student is admitted to the final inspection if he fulfills the conditions of the educational program and if he has scored at least:

The minimum number of points for the current educational activity, which is an admission to the final module control	Number of points
	Module 1
The minimum number of points corresponding to the grade "3" multiplied by the number of classes	5 x 14 = 70
Individual task	4
The minimum number of points for the final module lesson	50
The minimum number of points a student can score	**124**

The maximum number of points that a student can score is calculated by multiplying the number of points corresponding to the grade "5" by the number of topics in the module with the addition of points for individual independent work that the student can perform if desired.

The maximum number of points for the current educational activity that a student can score	**Number of points**
	Module 1
The maximum number of points corresponding to the grade "5" multiplied by the number of classes	8 x 14= **112**
Individual task	**8**
The maximum number of points for the final module lesson is	**80**
The maximum number of points a student can score is	**200**

The final module control is carried out after completing the study of all topics of the module at the last control session of the module.

The grade for the discipline is given only to students who have fulfilled all the conditions of the study program. The number of points a student earns from a discipline is defined as the sum of points for the current educational activity, points of the final control with the addition of points for individual independent work.

According to the decision of the Academic Council, incentive points can be added to the number of points in the discipline for students who have scientific publications or won prizes for participation in the Olympiad in the discipline among higher education institutions of Ukraine, etc.

The objectivity of the assessment of students' educational activity should be checked by statistical methods (the correlation coefficient between the current academic performance and the results of the final module control).

Conversion of the number of points from the discipline into grades according to the ECTS and 4-point (traditional) scales:

The number of points in the discipline awarded to students is converted into a 4-point (traditional) scale as follows:

Score on a 200-point scale	**Score on a four-point scale**
From 180 to 200 points	"5"
From 150 to 179 points	"4"
From 149 to the minimum number of points that must be scored by student	"3"
Below the minimum number of points that must score a student	"2"

20. REFERENCE

20.1 Basic

1. Biostatistics: methodology of statistical research. Part 1: Educational and methodological guide for independent training of students of the 3rd year of medical faculties No. 1, 2, 4 / Hrytsyuk M.I., Navchuk I.V., Chornenka Zha.A., Biduchak A.S., Mykalyuk L. V., Domanchuk T.I., Navchuk G.V., Hopko N.V., Myronyuk M.B. - Chernivtsi: VDNS of Ukraine "Bukovyn State Medical University", 2018. 120p.

2. Biostatistics: methodology of statistical research. Part 2: Educational and methodological guide for independent training of students of the 3rd year of medical faculties No. 1, 2, 4 / Hrytsyuk M.I., Navchuk I.V., Chornenka Zha.A., Biduchak A.S., Mykalyuk L. V., Domanchuk T.I., Navchuk G.V.,

Hopko N.V., Myronyuk M.B.. - Chernivtsi: VDNS of Ukraine "Bukovyn State Medical University", 2018. 120p.

3. M. Grytsiuk, E. Yasinska, Zh. Chornenka, A. Biduchak Fundamentals of Medical Statistics in Health Care. – Chernivtsi, 2018. – 193p.

3. Ukrainian-English dictionary-reference book of terms of social medicine, public health and biostatistics / [Biduchak AS, Hrytsiuk MI, Chornenka Zh.A., Domanchuk TI]. - Chernivtsi: VDNZ of Ukraine "Bukovynian State Medical University", 2019. – 148 p.5.

4. Current issues of the organization of the public health. Educational and methodological manual (electronic edition)/Biduchak A.S., Chornenka Zha.A., Domanchuk T.I. Chernivtsi, 2023 - 220 p. (on electronic media).

20.2. Helpful

1. Kaplan, Inc. Step 1. Lecture Notes. Kaplan Medical, 2018. 2567 p. 3. Населення України. Демографічний щорічник. К.: Держкомстат України. (режим доступу: www.ukrstat.gov.ua)..

2. Primer of Biostatistics, Seventh Edition. Stanton A. Glantz – McGraw-HillEducation, 2012. – 320 p.

3. Oxford Textbook of Global Public Health, 6 edition. Edited by Roges Detels, Martin Gulliford, Quarraisha Abdool Karim and Chorh Chuan Tan. Oxford University Press, 2017. 1728 p.

4. About the Sustainable Development Goals of Ukraine for the period up to 2030. Decree of the President of Ukraine dated September 30, 2019 No. 722/2019. Acceptance from 30.09.2019 https://zakon.rada.gov.ua/go/722/2019..

20.3. Information resources

- World Health Organization www.who.int
- European Health for All Database www.euro.who.int/en/home
- Cochrane Center for Evidence-Based Medicine www.cebm.net
- Cochrane Library www.cochrane.org
- US National Library of Medicine - MEDLINEwww.ncbi.nlm.nih.gov/PubMed
- Canadian Center for Evidence in Health Care.cche.net
- Centers for Disease Control and Prevention www.cdc.gov
- Public Health Center of the Ministry of Health of Ukraine www.phc.org.ua.
- Ukrainian database of medical and statistical information "Health for All": http://medstat.gov.ua/ukr/news.html?id=203
- British Medical Journal www.bmj.com
- Journal of Evidence-Based Medicine www.evidence-basedmedicine.com .
- www.moodle.bsmu.edu.ua

21. COMPILERS OF THE STUDENT HANDBOOK (SILABUS)

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