MINISTRY OF HEALTH OF UKRAINE
BUKOVINIAN STATE MEDICAL UNIVERSITY

APPROVE
Vice-Rector of the higher education establishment
for Scientific and Pedagogical Work
_____ Oksana HODOVANETS
28 08 2025

POSTGRADUATE STUDENT'S GUIDE (SYLLABUS) to study the discipline

«BIOSTATISTICS»

Field of knowledge –	22 Health Care
Specialty	221 Dentistry
Educational degree	third (Doctor of Philosophy)
Educational year	1
Form of study	full-time, part-time
Department	Social Medicine and Public Health

Approved at the meeting of the Department of Social Medicine and and Public Health «26» August 2025 (Protocol № 2).

Head of the Department _____ Ihor NAVCHUK

Approved by the Subject Methodological Commission for Hygienic Disciplines «27» August 2025 (Protocol № 1).

Chairman of the Subject methodological commission _____ Sviatoslav DEINEKA

Chernivtsi, 2025

1. GENERAL INFORMATION ABOUT SCIENTIFIC AND EDUCATIONAL STAFF WHO TEACH THE DISCIPLINE

Department	Social Medicine and Public Health
Surname, name of scientific and pedagogical staff, scientific degree, academic status	1. Biduchak Anzhela Stepanivna – Doctor of Medical Sciences, Associate Professor, biduchak.anzhela@bsmu.edu.ua 2. Chornenka Zhanetta Anatoliivna–PhD, Associate Professor, chornenka.zhanetta@bsmu.edu.ua
Website of the department at 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
Address	16 Yu. Fedkovycha St., Chernivtsi
Contact phone	

2. GENERAL INFORMATION ABOUT THE ACADEMIC DISCIPLINE

Status of the discipline	**compulsory**
Number of credits	3 credits
Total amount of hours	90 hours
Lectures	10 hours
Practical lessons	30 hours
Individual work	50 hours
Type of final control	credit

3. DESCRIPTION OF THE DISCIPLINE (ABSTRACT)

The academic discipline “Biostatistics” is a compulsory component in the training of doctoral candidates in the specialty 221 “Dentistry” and involves the study and analysis of basic biostatistical indicators and criteria based on the principles of evidence-based medicine.

4. POLICY OF THE DISCIPLINE

4.1. List of normative documents:

- Regulations on the organization of the educational process – https://cutt.ly/ArUqCMFh;
- Instructions for evaluating the academic performance of PhD students at BSMU in the context of implementing the European Credit Transfer System for organizing the educational process – https://surl.li/acuduy;
- Regulations on the procedure for reworking missed and uncredited classes – https://cutt.ly/jrUqBS36;
- Regulations on the appeal of the results of the final control of knowledge of higher education – https://cutt.ly/3rUqMAbV;
- Codex of Academic Integrity – https://cutt.ly/FrUq1ljK;
- Regulations on the prevention of academic plagiarism – https://cutt.ly/MrUq6QAt;
- Regulations on the procedure and conditions for students to choose elective courses – https://cutt.ly/srUwo6Ci;
- Regulations on the procedure for recognizing learning outcomes achieved through non-formal and/or informal education – https://cutt.ly/SrUwp1ie;
- Rules of conduct for students – https://cutt.ly/ErUq72rZ;
- Rules of internal labor regulations – https://cutt.ly/UrUwiACe.

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

- independent performance of educational tasks of current and final controls without the use of external sources of information;
- cheating during control of knowledge is 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 students:

- actions in professional and educational situations from the standpoint of academic integrity and professional ethics and deontology;
- compliance with the university's internal labor regulations and rules of conduct for students, be tolerant, friendly, and thoughtful in communicating with students and staff of departments, healthcare institutions, etc.
- 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 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 respectable reasons).

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

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

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

List of disciplines, on which the study of academic discipline is based	List of academic disciplines, for which the basis is laid as a result of studying the discipline
Medical and biological physics. Information technologies in dentistry.	
Biostatistics. Fundamentals of evidence-based medicine and public health in dentistry.	
Social medicine, public health. Medical law of Ukraine.	

6. PURPOSE AND OBJECTIVES OF THE COURSE:

6.1. The purpose of studying the discipline is to master the necessary knowledge, skills and acquire competencies in their practical application in the basics and principles of evidence-based medicine and biostatistics; analysis of the main biostatistical indicators and criteria in relation to the factors that influence them.

The academic discipline ensures that PhD candidates acquire the competencies and skills aimed at achieving the global Sustainable Development Goals for 2030, as defined by UN General Assembly Resolution No. 70/1 and Decree of the President of Ukraine No. 722/2019, in particular the implementation of Goal 4 “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”, which is achieved through the introduction of research-oriented learning, the formation of universal scientific skills, academic integrity, pedagogical competence, and readiness for lifelong learning, which are embedded in the competence and program outcomes of the discipline.

6.2. The main tasks of studying the discipline are:

- mastering the theoretical foundations of biostatistics;
- mastering modern principles of evidence-based medicine;

- familiarization with the methods of determining and analyzing the main biostatistical indicators and criteria;

- mastering the methodological and theoretical foundations of forming statistical sets for their further adequate analysis;

- mastering the methods of determining, analyzing and assessing the main indicators of population health according to individual criteria and in relation to the factors that influence it.

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

In accordance with the requirements of the higher education standard and the educational and professional program, the discipline ensures the acquisition of the following competencies by higher education applicants:

7.1. Integral competence:

the ability to produce new ideas, solve complex problems of dentistry and related interdisciplinary problems, apply the methodology of scientific and pedagogical activity, as well as conduct one's own scientific research, the results of which have scientific novelty, theoretical and practical significance.

7.2. General competencies:

GC02. Ability to search, process and analyze information from various sources.

GC04. Ability to work in an international context.

7.3. Professional (special) competencies:

SC01. The ability to perform original research, achieve scientific results that create new knowledge in dentistry and related areas of medicine and can be published in leading international scientific publications.

SC02. The ability to initiate, develop and implement complex innovative projects in the field of dentistry and related interdisciplinary projects.

SC03. The ability to present and discuss the results of scientific research and innovative projects in the field of dentistry orally and in writing in the state language and one of the official languages of the European Union, to publish the results of research in leading international scientific publications.

SC05. The ability to generate new ideas for the development of the theory and practice of dentistry, to identify problems, pose and solve research problems in the field of health care, to evaluate and ensure the quality of research performed in dentistry.

SC06. Ability to use modern digital technologies, databases and other electronic resources, specialized software in scientific and educational activities.

SC07. Ability to critically analyze, evaluate and synthesize new and complex ideas in the field of dentistry and related interdisciplinary issues.

8. RESULTS OF STUDYING THE DISCIPLINE.

The academic discipline ensures the formation of the following program learning outcomes (LO):

LO02. To deeply understand the general principles and methods of human health sciences, the main trends in their development, as well as the methodology of scientific research, to apply them in one's own scientific research in the field of dentistry and in teaching practice.

LO04. To formulate and test hypotheses; to use appropriate evidence to substantiate conclusions, in particular, the results of theoretical analysis, experimental studies, statistical data analysis, available literature data.

LO05. To apply modern tools and technologies for searching, processing and analyzing medical and biological information, in particular, statistical methods for analyzing large-scale and/or complex data, specialized databases and information systems.

LO06. To apply general principles and methods of research in the field of health care, as well as modern methods and tools, digital technologies and specialized software for conducting research in the field of dentistry.

LO09. Plan and carry out research in dentistry and related interdisciplinary areas using modern tools and adhering to the norms of professional and academic ethics, bioethics, good clinical practice (GMP), critically analyze the results of one's own research and the results of other researchers in the context of the entire complex of modern knowledge.

LO10. Develop and investigate models of processes and systems, effectively use them to obtain new knowledge and/or create innovative products in the field of dentistry and related interdisciplinary areas.

As a result of studying the academic discipline, the higher education applicant must:

8.1. ***Know:***

- basic statistical concepts: general and sample population, distribution parameters, types of variables, statistical error, confidence intervals;
- classification and purpose of statistical methods used in medical and dental science (parametric and non-parametric methods);
- principles of planning scientific research: randomization, blinding, control groups, types of studies (clinical, experimental, observational);
- methods of assessing the reliability of results, significance criteria (p-value), research power, type I and II errors;
- methods of analyzing medical data: descriptive statistics, correlation and regression analysis, survival analysis, multivariate models;
- methods of processing dental clinical data: analysis of clinical measurements, biomaterials, questionnaire data, radiological indicators;
- basics of working with statistical software (SPSS, R, Statistica, Jamovi, Excel);
- standards of evidence-based medicine and statistical interpretation of results for high-level scientific articles.

8.2. ***Be able to:***

- search, collect and prepare data for statistical processing according to the requirements of scientific research;
- choose correct statistical methods according to the type of data, design and hypotheses of the study;
- perform descriptive statistics: calculate means, standard deviations, medians, quartiles, confidence intervals;
- conduct:
    - t-test, ANOVA, MANOVA;
    - χ^2-test;
    - non-parametric criteria (Mann–Whitney U-test, Kruskal–Wallis, Wilcoxon, etc.);
    - correlation analysis (Pearson, Spearman);
    - regression analysis (linear, logistic);
    - ROC-analysis;
    - survival analysis (Kaplan–Meier, Cox regression);
    - perform statistical processing of dental clinical and experimental data;
    - create tables, graphs and visualizations for the presentation of statistical results;
    - interpret the obtained statistical data in the context of evidence-based dentistry and scientific hypotheses;
    - use statistical software for data analysis at a level sufficient for conducting a dissertation research;
    - prepare statistical sections for scientific articles, dissertations, presentations.

8.3. ***Demonstrate:***

- the ability to independently plan and perform the statistical part of a scientific research in dentistry;
- a high level of critical thinking when interpreting the results, determining the significance and practical significance;
- skills in working with a set of real statistical dental data, including incomplete and heterogeneous samples;

- the ability to clearly and professionally present the results of statistical analysis in oral and written forms (in Ukrainian and English);
- adherence to ethical and academic standards in collecting, processing and presenting data;
- ability to defend the choice of statistical methods in a reasoned manner before a scientific audience;
- high level of digital literacy and proficiency in modern analytical tools.

9. IINFORMATIONAL SCOPE OF THE DISCIPLINE

Description of each module of the discipline:

9.1. Specific objectives of the module.

Analyze and assess the state of dental health of the population. Analyze and assess medical and statistical data using standard approaches and computer information technologies. Assess the impact of adverse factors on the state of dental health of the population.

9.2. Thematic structure of the module.

Module 1. Biostatistics.

Content module 1. Methodology of statistical research.

Topic 1. Subject, tasks and methods of biostatistics in dental scientific research.

The essence of biostatistics as a science. The value of statistical analysis for evidence-based dentistry. Main areas of application: clinical trials of materials, assessment of the effectiveness of treatment, diagnostic methods, prediction of the state of the dento-maxillary system. Delimitation of descriptive and inferential statistics. The role of statistics in writing a dissertation and articles in international publications.

Topic 2. Design of scientific research in dentistry: concepts, approaches, requirements.

Types of research: experimental, quasi-experimental, observational. Designs: RCT, cohort study, cross-sectional, in vitro, in vivo. Comparative, diagnostic, prognostic studies. Choice of design depending on the scientific task. The role of design in minimizing errors.

Topic 3. Basic concepts of statistics: population, sample, parameters, variables.

The concept of general and sample populations. Types of variables: quantitative (continuous, discrete), qualitative (nominal, ordinal). Examples of variables in dentistry: periodontal pocket depth, KPU index, severity of pain syndrome, enamel thickness, radiological indicators. Sampling parameters and their properties.

Topic 4. Formulation of a scientific problem, goals, hypotheses and statistical assumptions.

Correct formulation of a scientific question. Working and null hypotheses. Dental examples: effectiveness of the material, comparison of treatment methods, influence of factors on the condition of the periodontium. The concept of "Hypothesis-driven research". Formation of assumptions regarding data distribution, normality, independence.

Topic 5. Planning a dental experiment: randomization, blinding, control.

Randomization methods: simple, block, stratified. Single and double blinding. Control groups: negative, positive, active, placebo. Features of planning clinical dental trials (materials, implantology, orthodontics). Reducing bias at the planning stage.

Topic 6. Types of errors in biomedical research: systematic, random, methodological.

Sources of errors in clinical research: errors of the instrument, measurer, subject. Sampling errors, information and selection errors. Errors of laboratory measurements (enamel microhardness, analysis of biomaterials). Methods of reducing errors.

Topic 7. Representativeness of the sample and methods of sample selection.

Probabilistic and non-probabilistic selection methods. Representativeness in dentistry: age, anatomical, social characteristics of patients. The problem of "clinical sampling" in dental research. Verification of representativeness and the possibility of generalizing results.

Topic 8. Calculation of sample size (Sample Size) and statistical power of the study.

Concepts of power, significance level, effect size. The influence of sample size on the reliability of the results. Formulas and use of programs (G*Power, R). Example: determining the sample for comparing the effectiveness of two filling materials.

Topic 9. Standards of evidence-based medicine for statistical studies in dentistry.

Main international guidelines: CONSORT (clinical trials), STROBE (observational studies), PRISMA (meta-analysis). Standards of reporting and statistical description. Application of these protocols in dental articles.

Topic 10. Ethical aspects of statistical planning and data processing.

Ethical requirements for working with data: confidentiality, informed consent, depersonalization. Manipulation of statistics (p-hacking, cherry-picking). Reproducibility and academic integrity. Responsibilities of the researcher in statistical reporting.

Topic 11. Data collection in dentistry: tools, forms, digital technologies.

Primary protocol form. Use of electronic medical records, digital scans, CBCT analysis. Survey tools (questionnaires, Pain scales). Unification and standardization of data collection in studies.

Topic 12. Data preparation for statistical analysis.

Creation of data tables, completeness check. Variable coding (ordinal, dummy-coding). Detection of outliers, anomalies, missing values. Normalization and transformation of dental data (log-transformation, Box-Cox).

Topic 13. Types of distributions in dental data.

Normal, lognormal, binomial, Poisson. Properties of distributions, their statistical diagnostics. Dental examples: distribution of the CPU index, enamel microhardness, number of complications. Influence of distribution on the choice of statistical methods.

Topic 14. Methods of visualization of dental data.

Types of graphs: histograms, Box-plot, scatterplot, violin plot. Construction of graphic models for dental measurements. Visualization of relationships (correlation matrices). Tools: Excel, R, SPSS, Python.

Topic 15. Descriptive statistics as a stage of research methodology.

Means, median, mode. Variance, standard deviation, coefficients of variation. Description of clinical dental variables. Rules for presenting descriptive data in a scientific article.

Topic 16. Testing statistical hypotheses: principles and logic of decision-making.

Null and alternative hypotheses. P-value, confidence intervals. Type I and II errors. Examples: effectiveness of caries treatment, difference in the speed of implant integration.

Topic 17. Selection of statistical criteria according to the type of data and research design. Test selection algorithm: type of variable, number of groups, normality of distribution. Parametric vs nonparametric criteria. Table of test selection for dental research. Typical errors when selecting criteria.

Topic 18. Methods of working with missing data (Missing data).

Types of omissions: MCAR, MAR, MNAR. Processing methods: complete cases, averages, regression imputation, multiple imputation. Examples: missing values in periodontal research.

Topic 19. Principles of reproducibility and validation of statistical results.

Validation of models: internal, external. Cross-validation. Replication of dental research. Quality control of statistical analysis.

Topic 20. Documentation and presentation of statistical methodology in scientific work.

How correctly describe statistical methods in an article. Statistical sections of the dissertation: structure, requirements, examples. Notes on transparency: algorithms, analysis codes, source data. Interpretation of results without manipulation.

Content module 2. Methodology of epidemiological studies

Specific objectives:

- Master the basics of epidemiological studies in dentistry.
- Analyze epidemiological data, identify risk factors, assess the effectiveness of preventive interventions and build prognostic models in accordance with international standards.
- Correctly present the results of medical and statistical studies in scientific publications, reports and dissertations, adhering to the principles of evidence and academic integrity.

Topic 1. Fundamentals of epidemiology and its role in dentistry.

Subject and tasks of epidemiology. Epidemiological approaches in assessing the dental health of the population. Determining the frequency of oral diseases, population trends. The importance of epidemiology for forming the evidence base of dentistry.

Topic 2. Types of epidemiological studies: descriptive, analytical, experimental.

Descriptive (cross-sectional). Analytical (cohort, case-control). Experimental (clinical trials,

preventive programs). Advantages and limitations of each type.

Topic 3. Descriptive epidemiology in dentistry: structure, tasks, methods.

Study of the prevalence and intensity of dental diseases. Epidemiological indicators (CPU, indices of gingivitis, periodontitis). Analysis by time, place, population.

Topic 4. Analytical epidemiological studies in dentistry.

Cohort-type studies: risk assessment, relative risk (RR). Case-control: odds ratio (OR), matched design. Examples: assessment of risk factors for caries, periodontitis, mucositis.

Topic 5. Experimental epidemiological studies (clinical and preventive).

Design of preventive programs in schools/childcare facilities. Randomized controlled trials in population dentistry. Methods of controlling influencing factors.

Topic 6. The concept of morbidity, prevalence and intensity of dental diseases.

Incidence, prevalence, attack rate. Features of calculating indices in dentistry. Construction of indicators by age groups.

Topic 7. Sample population in epidemiological studies.

Principles of constructing a representative sample. Stratification by age, sex, social status, region. Methods and errors of sampling.

Topic 8. Formation of research tools: questionnaires, indices, clinical standards.

Development of dental questionnaires and verification of their validity. Unified WHO indices. Calibration of researchers when conducting examinations.

Topic 9. Design of population dental examinations.

Organization of examination of large groups of children and adults. Randomization and multistage sampling design. Features of conducting field studies.

Topic 10. Risk factors for dental diseases: classification, assessment, significance.

Behavioral, biological, social, environmental factors. The concept of multifactoriality. Methods for determining risk (OR, RR, AF - attributive risk).

Topic 11. Methods for collecting epidemiological data in dentistry.

Questionnaires, clinical examinations, radiological methods. Use of digital applications and mobile platforms. Standardization of data for epidemiology.

Topic 12. Quality of epidemiological data: validity, reliability, reproducibility.

Intra- and inter-study variability. Coefficients of agreement (kappa, ICC). Calibration of researchers in dental examinations.

Topic 13. Epidemiological indicators in dentistry and their interpretation.

Average levels of indices, burden index, group distributions. Risk indicators and prevention effectiveness. Features of interpretation of dental data.

Topic 14. Multivariate analysis in the epidemiology of dental diseases.

Multivariate models: logistic regression, Cox models. Correction for confounding factors (confounding). Examples of risk models for caries and periodontitis.

Topic 15. Incidence and dental infections: epidemic process and its features.

Features of the spread of dental infections. Epidemic chain, reservoirs of infection, transmission factors. Microbiological aspects of epidemiology.

Topic 16. Modeling of epidemiological processes in dentistry.

Fundamentals of mathematical modeling. Forecasting the prevalence of caries, periodontitis. Use of Markov models, agent-based models in dentistry.

Topic 17. Environmental and social determinants of dental health.

Socio-economic factors. Environmental risks: fluoride, water pollution, environment. Models of social determinants in dentistry.

Topic 18. Evaluation of the effectiveness of preventive dental programs

Effectiveness indicators: NNT, ARR, RRR. Research on preventive programs in schools and communities. Criteria for long-term effectiveness.

Topic 19. Systematic reviews and meta-analyses in the epidemiology of dentistry

Methodology of conducting systematic reviews. Characteristics of studies for inclusion. Fundamentals of meta-analysis: forest plot, heterogeneity, models. Tools: RevMan, R.

Topic 20. Presenting Epidemiological Results in Dissertations and Scientific Articles

Description of epidemiological design, sampling, data collection methods. Formatting standards for tables and graphs. Presentation of risks, indices, prevalence. Transparency and adherence to ethical standards.

10. STRUCTURE OF THE DISCIPLINE

Names of content modules and topics	Amount of hours				
	Total	including			
		Classroom		Independent work	Individual work
		Lectures	Practicals		
1	2	3	4	5	6
Module 1. Biostatistics					
Content module 1. Methodology of statistical research					
Topic 1. Subject, tasks and methods of Biostatistics in dental scientific research.	2	2			
Topic 2. Design of scientific research in dentistry: concepts, approaches, requirements.	4		2		2
Topic 3. Basic concepts of statistics: population, sample, parameters, variables.	2			2	
Topic 4. Formulation of a scientific problem, goals, hypotheses and statistical assumptions. Correct formulation	2			2	
Topic 5. Planning a dental experiment: randomization, blinding, control.	4		2		2
Topic 6. Types of errors in biomedical research: systematic, random, methodological.	2	2			
Topic 7. Representativeness of the sample and methods of sampling	2			2	
Topic 8. Calculation of the sample size (Sample Size) and statistical power of the study.	2		2		
Topic 9. Standards of evidence-based medicine for statistical research in dentistry.	2		2		
Topic 10. Ethical aspects of statistical planning and data processing.	2			2	
Topic 11. Data collection in dentistry: tools, forms, digital technologies.	4			2	2
Topic 12. Data preparation for statistical analysis.	2			2	
Topic 13. Types of distributions in dental data.	2			2	
Topic 14. Methods of visualization of dental data.	2		2		
Topic 15. Descriptive statistics as a stage of research methodology.	2			2	

Topic 16. Testing statistical hypotheses: principles and logic of	2	2			
decision-making.					
Topic 17. Selection of statistical criteria according to the type of data and research design	2		2		
Topic 18. Methods of working with missing data.	2			2	
Topic 19. Principles of reproducibility and validation of statistical results.	2			2	
Topic 20. Documentation and presentation of statistical methodology in scientific work.	2		2		
Together with content module 1	**46**	**6**	**14**	**20**	**6**
Content module 2. Methodology of epidemiological studies					
Topic 1. Fundamentals of epidemiology and its role in dentistry.	2	2			
Topic 2. Types of epidemiological studies: descriptive, analytical, experimental.	2		2		
Topic 3. Descriptive epidemiology in dentistry: structure, tasks, methods.	2			2	
Topic 4. Analytical epidemiological studies in dentistry.	2		2		
Topic 5. Experimental epidemiological studies (clinical and preventive).	4		2		2
Topic 6. The concept of morbidity, prevalence and intensity of dental diseases.	2	2			
Topic 7. Sample population in epidemiological studies.	2			2	
Topic 8. Formation of research tools: questionnaires, indices, clinical standards.	2			2	
Topic 9. Design of population-based dental examinations.	2		2		
Topic 10. Risk factors for dental diseases: classification, assessment, significance.	2		2		
Topic 11. Methods of collecting epidemiological data in dentistry.	2			2	
Topic 12. Quality of epidemiological data: reliability, validity, reproducibility.	2			2	
Topic 13. Epidemiological indicators in dentistry and their interpretation.	2			2	

Topic 14. Multivariate analysis in the epidemiology of dental diseases.	2			2	
Topic 15. Morbidity and dental infections: the epidemic process and its features.	2		2		
Topic 16. Modeling of epidemiological processes in dentistry.	2			2	
Topic 17. Environmental and social determinants of dental health.	2			2	
Topic 18. Evaluation of the effectiveness of preventive dental programs.	2		2		
Topic 19. Systematic reviews and meta-analyses in the epidemiology of dentistry.	2			2	
Topic 20. Presentation of epidemiological results in dissertations and scientific articles.	2		2		
Together with the content module 2	**42**	**4**	**16**	**20**	**2**
Individual work	**2**				**2**
TOTAL HOURS	**90**	**10**	**30**	**40**	**10**

11. THEMATIC PLAN OF LECTURES

№ n /o	Topic name	Number of hours
1	Subject, tasks and methods of biostatistics in dental scientific research.	2
2	Types of errors in biomedical research: systematic, random, methodological.	2
3	Testing statistical hypotheses: principles and logic of decision-making.	2
4	Fundamentals of epidemiology and its role in dentistry.	2
5	Concepts of morbidity, prevalence and intensity of dental diseases.	2
TOTAL		**10**

12. THEMATIC PLAN OF PRACTICAL CLASSES

№ n /o	Topic name	Number of hours
1	Design of scientific research in dentistry: concepts, approaches, requirements.	2
2	Planning a dental experiment: randomization, blinding, control.	2
3	Calculation of sample size and statistical power of the study.	2
4	Standards of evidence-based medicine for statistical research in dentistry.	2
5	Methods of visualization of dental data.	2
6	Selection of statistical criteria according to the type of data and research design.	2
7	Documentation and presentation of statistical methodology in scientific work.	2
8	Types of epidemiological studies: descriptive, analytical, experimental.	2
9	Analytical epidemiological studies in dentistry.	2

10	Experimental epidemiological studies (clinical and preventive).	2
11	Design of population dental examinations.	2
12	Risk factors of dental diseases: classification, assessment, significance.	2
13	Incidence and dental infections: epidemic process and its features.	2
14	Assessment of the effectiveness of preventive dental programs	2
15	Presentation of epidemiological results in dissertations and scientific articles	2
TOTAL		**30**

13. THEMATIC PLAN FOR INDEPENDENT WORK

№ n /o	Topic name	Number of hours
1	Basic concepts of statistics: population, sample, parameters, variables.	2
2	Formulation of a scientific problem, goals, hypotheses and statistical assumptions.	2
3	Representativeness of the sample and methods of sampling.	2
4	Ethical aspects of statistical planning and data processing.	2
5	Data collection in dentistry: tools, forms, digital technologies.	2
6	Data preparation for statistical analysis.	2
7	Types of distributions in dental data.	2
8	Descriptive statistics as a stage of research methodology.	2
9	Methods of working with missing data (Missing data).	2
10	Principles of reproducibility and validation of statistical results.	2
11	Descriptive epidemiology in dentistry: structure, tasks, methods.	2
12	Sample population in epidemiological studies.	2
13	Formation of research tools: questionnaires, indices, clinical standards.	2
14	Methods of collecting epidemiological data in dentistry.	2
15	Quality of epidemiological data: validity, reliability, reproducibility.	2
16	Epidemiological indicators in dentistry and their interpretation.	2
17	Multivariate analysis in the epidemiology of dental diseases.	2
18	Modeling of epidemiological processes in dentistry.	2
19	Environmental and social determinants of dental health.	2
20	Systematic reviews and meta-analyses in the epidemiology of dentistry.	2
21	Independent work of the applicant	10
TOTAL		**50**

14. LIST OF INDIVIDUAL TASKS

The working curriculum provides for writing a coursework on the topic: "METHOD OF ANALYSIS OF DENTAL MORBIDITY".

Coursework objectives

1. To study the theoretical foundations of the analysis of dental morbidity and modern index methods.
2. To collect and systematize data on the dental condition of a certain sample of the population (children, adolescents, adults - depending on the topic).
3. To calculate the main dental indices, in particular DMFT, CPITN, OHI-S.
4. To assess the prevalence and intensity of dental diseases in the study group.
5. To analyze risk factors that may affect the level of morbidity.
6. To conduct statistical analysis and compare the results with WHO standards or regional indicators.
7. To formulate conclusions and recommendations for improving the dental health of the study group.

Stages of solving the problem:

1. Preparatory stage.

Choosing a topic and forming the purpose of the study.

Selecting literature (WHO, textbooks, Ukrainian statistical reports).

Determining the age group or population sample.

2. Data collection.

Conducting a dental examination or using existing statistical data.

Recording caries indicators, periodontal condition, hygiene, bite anomalies.

Filling out standard examination cards (WHO Oral Health Assessment Form).

3. Calculation of the main indices

3.1. KPU index (DMFT / dmft)

K — carious teeth

P (F) — filled

U (M) — removed

Calculation: KPU = K + P + U

3.2. Oral hygiene index (OHI-S)

Dental plaque and tartar are assessed on a scale from 0 to 3.

3.3. CPITN Index

Determination of periodontal status by sextants (bleeding, dental deposits, periodontal pockets).

4. Analysis of dental morbidity

Prevalence (%) – proportion of those examined with the disease.

Intensity** – average value of the CPITN index in the group.

Construction of tables and graphs.

5. Analysis of risk factors

May include:

- dental hygiene survey;
- nutritional assessment (sugar content);
- water fluoride analysis;
- features of access to dental care;
- socio-economic factors.

6. Statistical analysis

Calculation of mean values, median, standard deviation.

Comparison with data from other regions or WHO standards.

Grouping of results by age, gender, social characteristics.

7. Interpretation of results

Formation of conclusions about the level of dental morbidity.

Identification of the most problematic aspects.

Assessment of the effectiveness of existing preventive programs.

8. Development of recommendations

Preventive measures (hygiene programs, fluoridation).

Recommendations for school, community or medical institution.

Proposals for improving access to dental care.

15. INDEPENDENT WORK

Task 1. Calculate the arithmetic mean, mode, median, variation range and standard deviation for a sample of caries indicators in patients.

Task 2. Construct a comparative histogram of the distribution of the level of periodontitis and gingivitis in a group of patients and interpret its result.

Task 3. Determine the type of distribution (normal or not) using the Shapiro-Wilk test.

Task 4. Calculate the 95% confidence interval for the mean BMI value in a sample of 50 people.

Task 5. Conduct a t-test for independent samples (compare the mean level of enamel hypoplasia in men and women).

Task 6. Perform a paired t-test (before and after treatment) to analyze the effectiveness of therapy.

Task 7. Apply the Mann-Whitney U-test to compare two independent samples with a non-normal distribution.

Task 8. Calculate the Pearson correlation coefficient between age and the incidence of caries.

Task 9. Estimate the Spearman correlation between the level of anxiety and the number of symptoms.

Task 10. Build a linear regression model to predict the frequency of dental abscess depending on the time of patient presentation.

Task 11. Build a logistic regression model to estimate the probability of periodontitis in patients with diabetes.

Task 12. Calculate the relative risk (RR) of caries development among smokers and non-smokers.

Task 13. Calculate the odds ratio (OR) to determine the relationship between periodontitis and diabetes.

Task 14. Conduct an analysis using the χ^2 test to estimate the relationship between gender and the presence of dental disease.

Task 15. Calculate morbidity and mortality rates based on the provided demographic information.

16. METHODS AND FORMS OF CONTROL

16.1. Form, procedure, methodology and criteria for assessing current educational activities.

Current control is carried out at each practical lesson in accordance with the specific objectives of the topic, as well as during the individual work of the teacher with the higher education applicant for those topics that the applicant works on independently and they are not included in the structure of the practical lesson. It is recommended to use types of objective (standardized) control of theoretical and practical training of higher education applicants.

16.2. Form, procedure, methodology and criteria for assessing individual independent work.

A postgraduate student can perform additional tasks of a search, analytical, creative, research nature, participate in conferences with their own theses, reports, independently prepare presentation materials, work with the legislative framework.

Table for assessing the performance of individual work by higher education applicants

The postgraduate student completed the work (term paper) in compliance with the principles of academic integrity, independently formatted it in accordance with the standards and presented this work.	**20**
The postgraduate student completed the work with inaccuracies in the formatting of the work, publicly presented it	**15**
The postgraduate student completed the work with stylistic and syntactic errors, did not present it publicly	**10**
Did not prepare any individual work	**0**

16.3. Conditions for admission to the credit.

Postgraduate students who have successfully completed all tasks and received grades for work in practical classes, completed the necessary tasks in case of missing classes for good or bad reasons are allowed to take the credit.

16.4. Form, procedure, methodology and assessment criteria during the credit test.

The form of the credit test should be standardized and include control of theoretical and practical training. Specific forms of control in the discipline are determined in the working

curriculum. The maximum number of credit points is 200 points. The credit test is taken at the last practical lesson. The credit is considered to have been passed by the postgraduate student if he scored at least 120 points in the discipline.

17. LIST OF QUESTIONS FOR THE CREDIT

17.1. List of theoretical questions.

1. Subject, tasks and structure of biostatistics. Its significance for dental research.
2. Types of medical and dental research: descriptive, analytical, experimental.
3. Population and sample: types of samples, methods of their formation, representativeness.
4. Research errors: systematic and random; methods of their minimization.
5. Measurement scales (nominal, ordinal, interval, relative) and their application in dental research.
6. Indicators of central tendency: arithmetic mean, median, mode—properties, interpretation.
7. Indicators of variation: variance, standard deviation, coefficient of variation.
8. The law of normal distribution and its use in biostatistics.
9. Asymmetry and kurtosis: meaning, calculation methods, interpretation.
10. Confidence intervals: concept, interpretation, principles of construction.
11. Statistical hypotheses: types, errors of the first and second kind, level of significance.
12. Student's test: conditions of application and interpretation of results.
13. Nonparametric criteria (Mann–Whitney, Wilcoxon, Kruskal–Wallis): areas of application in dentistry.
14. Analysis of conjugation tables and the χ^2 test.
15. Correlation analysis: linear and rank correlation, Pearson's coefficient, Spearman's coefficient.
16. Regression analysis: model, parameters, evaluation, diagnostics.
17. Multiple linear regression and multicollinearity in clinical studies.
18. Logistic regression for the analysis of risk factors for dental diseases.
19. ROC analysis: criteria for sensitivity and specificity of diagnostic tests.
20. Evaluation of measurement reliability: agreement coefficient, κ-coefficient.
21. Variation series: construction, classification, graphical presentation methods (histogram, polygon).
22. Methods of patient selection and randomization in clinical dental studies.
23. Study power and calculation of the required sample size.
24. Epidemiological indicators in dentistry: prevalence, intensity, KPU/DMFT index.
25. Assessment of the effectiveness of dental interventions: absolute and relative risk, NNT, OR, RR.
26. Standardization of health indicators: direct and indirect.
27. Survival analysis: Kaplan–Meier curves, log-rank criterion.
28. Methods of controlling confounding factors: stratification, regression models, matching.
29. Reproducibility and validity of dental research.
30. Ethical and statistical aspects of planning clinical research in dentistry.

17.2. List of practical tasks.

Task 1. Interpret the Kaplan-Meier survival graph for dental cancer patients.
Task 2. Perform a critical analysis of the results of a clinical trial: evaluate the sample, design, statistical significance.
Task 3. Formulate a clinical question using the PICO model and find relevant sources of evidence.
Task 4. Assess the reliability and quality of a scientific article using evidence-based medicine criteria.
Task 5. Construct a 2×2 table for case/control data and calculate the sensitivity and specificity of a diagnostic test.

Task 6. Compare three groups of patients by caries level using a one-way analysis of variance (ANOVA).

Task 7. Apply multiple linear regression to assess the effect of age, gender, and physical activity on periodontitis.

Task 8. Analyze the relationship between the level of education of patients and adherence to treatment using the χ^2-criterion.

Task 9. Analyze the structure of the incidence in the population using structural indicators (%).

Task 10. Construct and analyze a contingency table to study the relationship between gender and caries incidence.

Task 11. Determine the absolute, relative and attributive risk for evaluating a preventive program.

Task 12. Calculate and compare mortality for two groups of patients with different forms of the disease.

Task 13. Conduct a stratified analysis to determine the effect of age as a modifier of the treatment effect.

Task 14. Construct a ROC curve to assess the accuracy of the diagnostic test and calculate the area under the curve (AUC).

Task 15. Analyze the case of an epidemic outbreak (data provided) and construct an epidemiological curve.

18. SCORE CALCULATION AND DISTRIBUTION SCHEME

When assessing the mastery of each topic of the postgraduate module, grades are given on a four-point (traditional) scale, using the assessment criteria adopted by the BSMU and approved by the methodological commission. In this case, all types of work provided for by the methodological development for studying the topic are taken into account. The grades given on a traditional scale are converted into points depending on the number of topics in the module. The weight of each topic in the module should be the same, but may be different in different modules.

Information on the distribution of points that are assigned to applicants for higher education during the study of the academic discipline with notes:

- on the maximum and minimum number of points for studying the module;

The maximum number of points that a postgraduate student can score is calculated by multiplying the number of points corresponding to a grade of "5" by the number of topics in the module, adding points for individual work:

Maximum number of points for studying the module	**Number of points**
	Module 1
The maximum number of points corresponding to the grade "5" multiplied by the number	12 x 15 = 180
Maximum number of points for the IP	**20**
Maximum number of points for studying the module	**200**

The minimum number of points that a postgraduate student can score is calculated by multiplying the number of points corresponding to a grade of "3" by the number of topics in the module, adding points for individual work:

Minimum number of points for studying the module	**Number of points**
	Module 1
Minimum number of points corresponding to a grade of "3" multiplied by the number of classes	8 x 15 = **120**
Minimum number of points for IR	**10**
Minimum number of points for studying the module	**130**

- about converting points into traditional grades "5", "4", "3", "2" when mastering the module topic:

Traditional Grade	Conversion into Points
	Module 1
«5»	18
«4»	10
«3»	8
«2»	0

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

Discipline points	Grade on a 4-point scale
від 180 до 200	«5»
від 150 до 179	«4»
від 120 до 149	«3»
менше 120	«2»

- about the minimum number of points for admission to the credit;

Module number, number of teaching hours/number of ECTS credits	Number of content modules, their numbers	Number of practical classes	Conversion into traditional grades points					Minimum number of points
			Traditional grades				Points for completing an individual task	
			«5»	**«4»**	**«3»**	**«2»**		
Module 190 / 3	2 №1-2	15	12	10	8	0	20/15/10	120

- *about the minimum number of points for passing the credit.*

Minimum number of points for studying the module	Number of points
	Module 1
Minimum number of points corresponding to a grade of "3" multiplied by the number of classes	8 x 15 = **120**
Minimum number of points for IR	**10**
Minimum number of points for studying the module	**130**

19. RECOMMENDED LITERATURE

19.1 Basic (basic):

1. Biduchak A.S., Chornenka Zha.A., Domanchuk T.I. Current issues of the organization of the public health. Educational and methodological manual (electronic edition)/ Chernivtsi, 2023 - 220 p. (on electronic media).
2. 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.
3. Population dental health and organization of dental care. Educational manual. Navchuk I.V., Chornenka Zh.A., Biduchak A.S., Vlasyk L.Y., Yasynska E.Ts., Domanchuk T.I., Hopko N.V., Myronyuk M.B. Chernivtsi: Bukovinian State Medical University, 2025. 236 p.
4. 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.

5. 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.

19.2 Additional:

1. Kaplan, Inc. Step 1. Lecture Notes. Kaplan Medical, 2018. 2567 p. 3. Population of Ukraine. Demographic Yearbook. Kyiv: State Statistics Committee of Ukraine. (Access mode: 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
5. Daniel W. W., Cross C. L. Biostatistics: A Foundation for Analysis in the Health Sciences. – 10th ed. – Hoboken : Wiley, 2018. – 720 p.

19.3 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 .

20. COMPILERS OF THE REFERENCE MANUAL (SYLLABUS):

1. Biduchak A.S. – Doctor of Medical Sciences, Associate Professor of the Higher Education Institution of the Department of Social Medicine and Health Care Organization.
2. Chornenka Zh.A. – PhD, Associate Professor of the Higher Education Institution of the Department of Social Medicine and Health Care Organization.