AL-FARABI KAZAKH NATIONAL UNIVERSITY
FACULTY OF MEDICINE AND HEALTHCARE
DEPARTMENT OF EPIDEMIOLOGY, BIOSTATISTICS, AND EVIDENCE-BASED MEDICINE

FINAL EXAM PROGRAM FOR THE DISCIPLINE

BIOSTATISTICS AND EPIDEMIOLOGY

5 Credits

COMPILED BY: Associate Professor F.A. ISKAKOVA

TEACHING AND LEARNING COMPLEX
OF THE DISCIPLINE IS APPROVED
at the meeting of the Academic Council of the Faculty
of Medicine and Healthcare, Minutes No. ____ dated "____" _____.
Reviewed and recommended at the meeting of
the Department of Epidemiology, Biostatistics and EBM,
dated "____" _____, Minutes No. ____.
Recommended by the Methodological Bureau of
the Faculty on "____" _____, Minutes No. ____.

Almaty, 2025

PROGRAM
of the final exam in the discipline "Biostatistics and Epidemiology"

Academic Topics Included in the Exam: The final exam in the discipline "Biostatistics and Epidemiology" will be conducted in two stages in the form of a creative assignment / online in the LMS MOODLE (report on the conducted research) and defense of the creative assignment / online.
The deadline for submitting the report (uploading for plagiarism check) is 24 hours before the start of the oral defense.
Oral defense will be held at the time specified in the exam schedule!

The thematic content covers all types of work: topics of practical classes, as well as assignments for master's students' independent work.

Learning Outcomes:

In preparation for the exam, it is necessary to review the main theoretical content of the course, terminology, and methods.

Upon completion of the course, the master's student should be able to:

1. Describe the fundamental concepts, typology of study designs, core methodologies, and principles of statistical analysis in epidemiological research.
2. Design a protocol for an epidemiological study.
3. Perform descriptive statistical analysis of research datasets.
4. Select and apply appropriate inferential statistical tests based on study aims and data characteristics.
5. Describe the fundamental concepts, typology of study designs, core methodologies, and principles of statistical analysis in epidemiological research.

List of Exam Topics for Preparation

TOPIC 1. The Science of Epidemiology. Definition, Core Functions, and Role of Epidemiology in Public Health.
TOPIC 2. Summarizing Data, Measuring Disease Frequency and Risk. Application of Standardization.
TOPIC 3. Study Planning. Ecological Study. Case-Control Study.
TOPIC 4. Study Planning. Cohort Studies. Experimental Studies.
TOPIC 5. Diagnostic and Screening Tests. Sensitivity, Specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) of Tests.
TOPIC 6. Working in MS Excel. Organization and Logic of Database Creation. Calculation of Descriptive Statistics Measures.
TOPIC 7. Analysis of Qualitative (Categorical) Variables. Fisher's Exact Test. Chi-Square

Test. Z-test for Comparing Proportions.
TOPIC 8. Conducting One-Way Analysis of Variance (ANOVA).
TOPIC 9. Application of Student's t-test for Paired (Dependent) and Independent Samples.
TOPIC 10. Measuring the Association Between Quantitative Variables. Correlation Analysis. Simple (Univariate) Linear Regression Analysis.
TOPIC 11. Application of Nonparametric Tests. Mann-Whitney U Test. Wilcoxon Signed-Rank Test.
TOPIC 12. Comparison of Multiple Groups. Kruskal-Wallis H Test. Friedman Test.
TOPIC 13. Assessment of Nutrition and the Impact of Harmful Substances Associated with Food Quality and Preparation on the Population's Health.
TOPIC 14. Linear and Logistic Regression. (Note: The numbers "3 7 15" at the end of the line are preserved as is, possibly numbering or a code)
TOPIC 15. Fundamental Principles of Data Analysis. Analysis of Stratified Data and Statistical Results. Hypothesis Testing.

Typology and Sample Content of Exam Tasks:
The exam in the discipline "Biostatistics and Epidemiology" is conducted in two stages in the form of a creative assignment (report on the conducted research and statistical data processing) online and the defense of the creative assignment online.
The results of the creative assignment are presented as a report on the conducted research and statistical data processing (in MS Word editor). The report should reflect the objectives, method, and results of the study.
Note: The work is done individually and is checked for plagiarism!
Project submission deadline (uploading for plagiarism check): 24 hours before the start of the oral defense.
Oral defense will be held at the time specified in the exam schedule!

Creative Assignment Template
A scenario of an epidemiological situation and a database are provided.
Task:
Perform an assignment to assess the situation using descriptive and analytical research methods, and statistical analysis methods using the IBM SPSS program.
Description:
Define the objectives and select epidemiological research methods, formulate a research hypothesis, use the database, identify variables, select statistical analysis methods, describe the research results using tables or diagrams, and summarize. Draw conclusions.

Grading Criteria

Traditional Grade	Points	Characteristics of the Work
Excellent	90-100 points	The work is completed independently and at a high scientific and methodological level. The response text shows that the student can reflect (evaluate and process) mastered scientific methods and methods of activity, and is also able to propose concepts, models, and use new methods and tools of professional activity. The work presents the author's vision of the problem and corresponding argumentation. The work is done neatly; the student masters professional terminology and skills in writing scientific papers.
Good	75-89 points	The work is generally well written, but the author has not disclosed or has not fully covered certain issues of the topic. The work does not present the author's vision of the problem. The work contains some inaccuracies, but they do not relate to the main content of the work. The answer demonstrates knowledge and understanding of the material by at least 75%.
Satisfactory	50-74 points	The assignment is generally completed, but the author has not demonstrated skills in analyzing the problem, has not disclosed or has omitted certain issues of the topic. The work does not present the author's vision of the problem. The author does not sufficiently master the methodology of scientific research. The answer contains inaccuracies related to the main content of the question.
Unsatisfactory	0-49 points	The assignment is not completed, or completed less than 50%, or completed incorrectly.

Rules for Evaluating Stages:

- Oral Defense: 40%
- Written Work: 60%

Bibliography:

1. Gordis Epidemiology, Sixth Edition. 2019.-ElSEVIER.-434 p.
2. Rothman, Kenneth J.; Greenland, Sander; Lash, Timothy L. Modern Epidemiology, 3rd Edition - 2008 Lippincott Williams & Wilkins

3. Principles of Epidemiology in Public Health Practice Third Edition An Introduction to Applied Epidemiology and Biostatistics. CDC, USA, 512 p.
4. Kaplan Medical USMLE Step 1: Behavioral Science Lecture Notes Paperback – January 1, 2013
5. Biyasheva, Zarema Maratovna. Introduction to Biostatistics (Biometry) [Text] : educational man. / Z. M. Biyasheva, A. V. Lovinskaya, 2017. - 181 p.
6. Aviva Petrie, Caroline Sabin. Medical Statistics at a Glance. Textbook for universities. Moscow, GEOTAR-Media, 2015. 168 p. (in Russian).
7. Nasledov A. N31 IBM SPSS Statistics 20 and AMOS: professional statistical data analysis. — St. Petersburg: Piter, 2013. 416 p. (in Russian).
8. Elizabeth De Poy, Laura N. Gitlin; trans. from English. Ed. by V.V. Vlasov. Introduction to Research: Understanding and Applying Multiple Strategies in Medicine and Healthcare – Moscow: GEOTAR-Media, 2017. – 432 p. (in Russian).