AL-FARABI KAZAKH NATIONAL UNIVERSITY

FACULTY OF MEDICINE AND PUBLIC HEALTH

DEPARTMENT OF EPIDEMIOLOGY, BIOSTATISTICS AND EVIDENCE-BASED MEDICINE

PRPOGRAM

ON FINAL EXAM IN THE DISCIPLINE

Working with Databases and Evaluation of Research Results

5 credits

DEVELOPED BY: Assoc.Professor F.A.Iskakova

COURSE WORKLOAD AND
CURRICULUM (UMK) APPROVED
at the meeting of the Academic Council of the Faculty of Medicine and Public Health
Protocol No. . from "" _____.
REVIEWED AND RECOMMENDED
at the meeting of the Department of Epidemiology, Biostatistics and EBM
from "" _____., protocol No.
RECOMMENDED by
the Methodological Bureau of the Faculty "" _____., protocol No.

Almaty, 2025

PROGRAM for the Final Examination in the Discipline "Working with Databases and Evaluation of Research Results"

Exam Topics and Scope: The final examination in the discipline "Working with Databases and Evaluation of Research Results" will be conducted in two stages: as a creative assignment/online task in the Moodle LMS (a report on statistical data processing) and a defense of the creative assignment/online.
The deadline for report submission (upload for plagiarism check) is 24 hours before the scheduled oral defense.
The oral defense will be held according to the time specified in the examination schedule!
The thematic content covers all types of coursework: topics from practical classes, as well as assignments for independent work by master's students.

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. Possess skills in applying scientific knowledge of the theory and practice of statistical analysis;
2. Independently organize and perform statistical processing of a database containing scientific research results.
3. Conduct statistical analysis of scientific research results.
4. Analyze statistical research using quantitative methods and new information technologies.
5. Share obtained research results with the scientific community, engage in dialogue, and defend their point of view.

List of Exam Topics for Exam Preparation

Topic 1. Software for Data Analysis and Processing. Using MS Excel. Formula Creation. Statistical Functions. The Logical "IF" Function. Absolute and Relative Cell References in Formulas. Function Wizard. Nested Functions.
Topic 2. Using the Analysis ToolPak in MS Excel. Graphical Representation of Statistical Measures in MS Excel. Descriptive Statistics. Histogram. Frequency Polygon. Chart Wizard.
Topic 3. Relational Databases. DBMS Access. MS Access Workspace Interface Elements. Types and Purposes of MS Access Database Objects.
Table Designer. Creating a Table, Field, Record, Lookup, Key. Properties and Data Types of Table Fields in MS Access. Primary Fields. The Counter is a special field type. Data Import and Export.
Topic 4. Creating Queries. Modifying Data Using Action Queries. Aggregate Operations. Expression Builder. Operators in Numeric Expressions. Calculated Fields. Defining Relationships in the Relationships Window.
Creating Queries, Types of Queries, Entering Criteria.
Operators LIKE, BETWEEN, IN, AND and OR. Working in the Expression Builder and Using Aggregate Operations. Aggregate Functions, Expression Builder, Built-in IIF Function. Relationships Window. Key, Indexed Field.
Topic 5. Working with Forms in MS Access. Form Wizard. Creating a Main Switchboard Form. Creating Forms. Adding a Button, a Label. Using Macros.
Topic 6. Introduction to SPSS. Main SPSS Windows. Creating and Editing a Database in SPSS. Measurement Scales for Variables. Data Import and Export.
Data Editor Window. Variable View. Data View. Program Menu.
Topic 7. Performing Basic Data Operations in SPSS. Data Selection. Data Transformation. Computing New Variables.
Data Management Commands, Data Menu, Transform Menu. Missing Values.

Topic 8. Statistical Tests for Checking Distribution in SPSS.
Main Parameters of Descriptive Statistics and Tests for Checking Normality of Distribution. Measures of Central Tendency, Measures of Variability, Shapiro-Wilk Test, Kolmogorov-Smirnov Test.
Topic 9. Parametric Tests in SPSS. Comparing Independent Groups.
Step-by-step algorithm for calculating Student's t-test, method for determining differences between group means in normally distributed populations.
Levene's Test, Asymptotic Significance, Confidence Interval. Step-by-step algorithm for calculating Analysis of Variance (ANOVA), Variance, ANOVA, Within-Group and Between-Group Variances, Fisher's F-test.
Topic 10. Parametric Tests in SPSS. Comparing Repeated Measurements.
Step-by-step algorithm for calculating Paired Student's t-test. Conditions for Application. One-Way Repeated Measures ANOVA in SPSS.
Topic 11. Statistical Tests for Contingency Tables in SPSS.
Conditions and Limitations for Applying Pearson's Chi-Square Test. Interpreting the Pearson's Chi-Square Test Value. Methods for Assessing Association between Qualitative Variables, Contingency Table, Pearson's $\chi 2$ Test, 2x2 Contingency Table, Cramer's V (or other appropriate measure like Phi).
Topic 12. Non-Parametric Tests in SPSS. Comparing Two Groups.
Step-by-step algorithm for applying non-parametric tests.
Ranking the Variable, Mann-Whitney U Test, Degrees of Freedom, Sign Test, Wilcoxon Signed-Rank Test.
Topic 13. Non-Parametric Tests in SPSS. Comparing Three or More Groups.
Step-by-step algorithm for applying non-parametric tests, Kruskal-Wallis Test, Friedman Test.
Topic 14. Correlation Analysis in SPSS.
Methods for Assessing Association between Quantitative Variables (Correlation Analysis), Pearson's Method (Pearson Correlation), Spearman's Rank Method (Spearman Correlation).
Topic 15. Simple Linear Regression in SPSS.
Step-by-step algorithm for calculating Linear Regression.

Typology and Approximate Content of Examination Tasks:

The examination in the discipline "Working with Databases and Evaluation of Research Results" is conducted in two stages: an online creative assignment (a report on statistical data processing) and an online defense of the creative assignment.
The results of the creative assignment are presented in the form of a statistical data processing report (in MS Word). The report must be accompanied by the database file and the file containing the statistical processing.
Note: The work is performed individually and is checked for plagiarism!
The project submission deadline (upload for plagiarism check) is 24 hours before the scheduled oral defense.
The oral defense will be held at the time specified in the examination schedule!

Creative Assignment Template

Condition

Complete tasks on the application of comparative analysis methods and the study of relationships between the investigated variables.

Description

Formulate the task condition.
Describe the sequence of the research process and justify the choice of methods used.
Describe the obtained research results using tables or diagrams.
Conclude.

Grading Criteria

Traditional Grade	Points	Work Characteristics
Excellent	**90-100**	The work was completed independently and at a high scientific and methodological level. The text demonstrates that the student is capable of reflecting upon (evaluating and reworking) mastered scientific methods and approaches, and is also able to propose concepts, models, and utilize new techniques and tools of professional activity. The work presents the author's perspective on the problem and corresponding argumentation. The work is executed neatly; the student commands professional terminology and scientific writing skills.
Good	**75-89**	The work is generally well written, but the author has failed to address or has only partially covered specific aspects of the topic. The work does not present the author's unique perspective on the problem. Some inaccuracies are present in the work, but they do not pertain to its core content. The answer demonstrates knowledge and understanding of at least 75% of the material.
Satisfactory	**50-74**	The task has been completed in general, but the author has not demonstrated problem-analysis skills; specific aspects of the topic are either not addressed or insufficiently covered. The work lacks the author's perspective on the problem. The author shows insufficient command of scientific research methodology. The response contains inaccuracies regarding the question's core content.
Fail	**0-49**	The task was not completed, or was completed less than 50%. The task was completed incorrectly.

Assessment Rules for Stages:
Oral Defense: 40%
Written Work: 60%

References:

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2. Petrie, A., & Sabin, C. (2015). Medical statistics at a glance. Moscow: GEOTAR-Media. Nasledov, A. (2013). IBM SPSS Statistics 20 and AMOS: Professional statistical data analysis. St. Petersburg: Piter.
3. DePoy, E., & Gitlin, L. N. (2017). Methods of scientific research in medicine and healthcare (V. V. Vlasov, Ed.; Russian ed.). Moscow: GEOTAR-Media.
4. Koichubekov, M. A., Sorokina, A. S., Bukeeva, & others. (2016). Biostatistics in examples and exercises: Teaching manual for universities. Almaty: Evero.
5. Koichubekov, B. K. (2015). Biostatistics: Textbook. Almaty: Evero. Additional Literature
6. Grjibovski, A. M., Ivanov, S. V., & Gorbatova, M. A. (2016). Descriptive statistics using Statistica and SPSS: Testing distributions. Science and Healthcare, 1, 7–23.

7. Grjibovski, A. M., Ivanov, S. V., & Gorbatova, M. A. (2016). Comparison of two independent samples using Statistica and SPSS: Parametric and nonparametric criteria. Science and Healthcare, 2, 5–28.
8. Grjibovski, A. M., Ivanov, S. V., & Gorbatova, M. A. (2016). Comparison of two paired samples using Statistica and SPSS. Science and Healthcare, 3, 5–25.
9. SPSS Tutorials Home - LibGuides - Kent State University//https://www.google.com/search?q= spss+ tutorials+ by+kent+state+university&oq=spss&gs_lcrp=EgZjaHJvbWUqCAgBEEUYJxg7MgkIABBFGDkYgAQyCAgBEEUYJxg7MggIAhBFGCcYOzIGCAMQRRg7MgcIBBAA
10. SPSS for Beginners: Statistics//https://www.youtube.com/watch?v=_zFBUfZEBWQ
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