Al-Farabi Kazakh National University
Faculty of Medicine and HealthCare
Education program in the specialty:
«6B10105 Public Health»

GUIDELINE ON SEMINARS FOR MASTER'S STUDENTS ON COURSE "DATABASE CREATION AND EVALUATION OF RESEARCH RESULTS" 5 credits

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Module 1: Measurement Scales and Data Management

Seminar 1: Software for data analysis in Excel.
Objective: Learning Objective: Transition from using Excel as a simple spreadsheet to a tool for preliminary data analysis and visualization. Use statistical and logical functions (COUNTIFS, SUMIFS, AVERAGEIF, VLOOKUP/XLOOKUP, IF, AND/OR) to clean, summarize, and interrogate public health datasets.
Practical Task: Clean a dataset of patient survey responses, calculate summary health indicators by demographic groups, and flag data inconsistencies.
Work with Database Market Survey.

Seminar 2: Analysis Tool Pak in Excel, a graphical presentation of data.
Objective: Employ the Analysis ToolPak for descriptive statistics and create effective graphical presentations of health data.
Practical Task: Generate descriptive statistics (mean, median, variance) for a set of biomarker readings. Create and interpret histograms, box plots, and scatter plots to visualize distributions and relationships.
Work with Database Market Survey in Excel Program.

Seminar 3. Relational databases in MS Access, interface, database objects
Learning Objective: Understand and construct a relational database to manage complex, related public health data efficiently.
Practical Task: Design a schema for a cohort study linking Participants, ClinicalVisits, and LabResults tables.
Work with the Database in MS Access.

Seminar 4: Queries, data modification, group operations, calculated fields, schema design.
Objective: Create queries to select, filter, calculate, and aggregate data using calculated fields and group operations (GROUP BY).
Practical Task: Build queries to calculate average BMI by age group, merge data from related tables, and update records based on criteria.

Seminar 5: Forms in MS Access; database project
Objective: Develop user-friendly forms for data entry and navigate a complete database project.
Practical Task: Create a form for entering new patient visit data and assemble the previous components into a functional project.

Module 2: Descriptive Analysis and Data Reliability
Seminar 6. Introduction to SPSS, database creation, scales of measurement, import/export.
Learning Objective: Master SPSS for comprehensive statistical analysis, from data preparation to advanced inferential tests common in public health research. Navigate SPSS, define variables correctly according to scales of measurement (Nominal, Ordinal, Scale), and import data.
Practical Task: Import an Excel dataset, define variable types, and use Recode and Compute to transform variables (e.g., creating age categories from a continuous variable).
Work with the Database.

Seminar 7: Data operations in SPSS (selection, transformation, new variables).
Objective: work with data: operate, select, transform create new variables.
Practical Task: create 5 new variables of different types, and code of them.

Seminar 8. Test for normality of distribution data in SPSS; Assessing Data Distribution & Parametric Testing I
Objective: Evaluate if the data meet assumptions for parametric tests and perform basic comparisons.
Practical Task: work with continuous data, check for estimation of normality distribution.

 Seminar 9. Parametric tests in SPSS: One Sample T-Test, Independent Sample T-Test.
Objective. Using parametric tests.
Practical work: Use descriptive statistics, histograms, and tests like Shapiro-Wilk to assess normality. Conduct a **One-Sample T-Test** (compare sample mean to a national average) and an **Independent Samples T-Test** (compare means between two groups, e.g., male vs. female).

Seminar 10: Parametric tests in SPSS: Paired T-Test and one-ANOVA Test
Objective: Apply tests for paired data and multiple group comparisons, and analyze categorical associations.
Practical Task: Perform a **Paired Samples T-Test** (e.g., pre- vs. post-intervention blood pressure) and a **One-Way ANOVA** (compare mean BMI across 3+ ethnicities). **Module 3: Dependency Analysis and Data Comparison**

Seminar 11: Chi-Square Test.
Objective: Conduct a **Chi-Square Test** to examine the association between smoking status (yes/no) and disease diagnosis (yes/no).
Practical Task: using a Chi-Square test for your data.

Seminar 12. Non-Parametric Tests: Mann–Whitney U Test for two independent groups. Wilcoxon Signed-
Objective: Use appropriate non-parametric alternatives when parametric assumptions are violated.
Practical Task: Run a **Mann-Whitney U Test** (non-parametric alternative to independent t-test) and a **Wilcoxon Signed-Rank Test** (non-parametric alternative to paired t-test). Perform the **Kruskal-Wallis H Test** (non-parametric alternative to one-way ANOVA).

Seminar 13: Non-Parametric Tests: Kruskal–Wallis Test for more than two independent groups.
Objective: Using this test for the analysis of more than two independent groups from your Database.

Seminar 14. Correlation & Regression Analysis
Objective: Explore relationships between variables and build simple predictive models.
Practical Task: Calculate and interpret **Pearson's/Spearman's correlation** between physical activity level and cholesterol.

Seminar 15. Simple/ multiple linear regression and logistic regression in SPSS.
Objective: to study this type of regression in SPSS.
Practical Task: Run a **Simple Linear Regression** to predict BMI from calorie intake.
Introduction to **Multiple Linear Regression** and **Logistic Regression** concepts with a practical demo (e.g., predicting disease presence based on multiple risk factors).

Literature:
1.High-yield biostatistics, epidemiology, and public health / Anthony N. Glaser, MD, PhD, clinical assistant professor, Medical University of South Carolina. — 4th edition.
2. Kaplan Medical, Behavioral Sciences, USMLE, 2017, 471 p.

3.Rosner, B. Fundamentals of Biostatistics, 8th edition, 2015. (Available at the Coop and also at Amazon.com). (Includes access to website containing Study Guide and Data Sets)
4. Rosner, B. Lecture Notes for Fundamentals of Biostatistics, 2016. http://isites.harvard.edu/course/ext-24540/2016/spring)
5.Medical Statistics at a Glance Workbook. Front Cover. Aviva Petrie, Caroline Sabin. John Wiley &Sons, 2013 - Medical - 120 p.
6. SPSS Tutorials: Home - LibGuides - Kent State University//https://libguides.library.kent.edu/SPSS

Software: MS Excel, MS Access, IBM SPSS