

Al-Farabi Kazakh National University
Faculty Medicine and Health Care
Education program on specialty:
«Pharmacy» for bachelor's degree

MANUAL TO CLASSES OF COURSE “INTRODUCTION TO BIOSTATISTICS” for
PHARMACY

4 credits

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CLASSES TOPIC

ON COURSE “PROFESSIONAL (FOREIGN) LANGUAGE”

Class 1

Introduction to Epidemiology, Epidemiological Studies and Statistics. Basic of Statistics. Definition, function, types of statistics.

Class 2

Summarizing Data. Organizing of Data. Types of Variables. Frequency Distributions. Properties of Frequency Distributions. Methods for Summarizing Data. Measures of Central Location. Construct a frequency distribution. Calculate and interpret four measures of central location: mode, median, arithmetic mean, and geometric mean. Apply the most appropriate measure of central location for a frequency distribution. Apply and interpret four measures of spread: range, interquartile range, standard deviation, and confidence interval (for mean).

Class 3

The subject of statistics. Types of population. Sampling population. Basic requirements for sampling. Software for data analysis and processing. Application of Ms. Excel in statistics. using the data and formula buttons.

Key Terms and Concepts. Population at risk. Units of observation. Sample size statistical Calculator and formula. Excel manual. Study and work in the Excel program using formulas. Tables, Graphs, Diagrams.

Class 4

The concept of variability in statistical analysis. Nature of distribution option. Normal distribution. Characterization of population units. Descriptive statistics. Software for data analysis and processing. Application of IBM SPSS program for statistics.

Key terms and concepts. Types of descriptive statistics. Frequency distribution. Measures of central tendency. Measures of variability. Univariate descriptive statistics. Bivariate descriptive statistics

Class 5. SPSS analysis package (tutorials). Statistical criteria for testing distributions in SPSS. Variation series. Construction of a variational series. Performing basic operations on data in SPSS. Data selection. Data transformation. Calculating new variables.

Class 6. Parametric tests. An Introduction to t Tests. Definitions, Formula and Examples. Three types of T-test: one-sample T-test, two-sample T-test, and two-sample paired T-test.

Class 7. Overview of T-test. Hypothesis testing guide. Null vs. alternative hypotheses. Statistical significance, p value. Type I & Type II errors. Statistical power.

Class 8. Analysis of nominal variables (Pearson's chi-square test, Fisher's exact test, odds ratio, relative risk). The trait being studied (compared): A categorical variable measured on a nominal or ordinal scale. For example: presence of disease, severity of disease, presence of complication, fatal outcome, achievement of therapeutic effect.

Class 9. Non-parametric methods of analyzing quantitative data: Mann-Whitney test, Kraskell-Wallis test. Trait under study: A quantitative variable that has a "non-normal" distribution in at least one of the groups being compared. For example: Age, blood pressure, HR, white blood cell count, body temperature, number of bed-days spent in hospital. + VAS pain score, results of psychological tests.

Class 11. Correlation. Using a correlation coefficient. Interpreting a correlation coefficient. Visualizing linear correlations. Types of correlation coefficients. Pearson's correlation coefficient. Spearman's correlation coefficient.

Class 12. Linear regression. Assumptions of simple linear regression. How to perform a simple linear regression. Interpreting the results. Presenting the results. Can you predict values outside the range of your data? Dependent variable: Quantitative (ordinal) variable For example: age, body mass index, length of hospitalization, blood pressure, laboratory values. Dependent variable: Quantitative (ordinal) variable. For example: age, body mass

index, length of hospitalization, blood pressure, laboratory values

Class 13. Logistic regression. Binary logistic regression. Sensitivity and specificity of predictive models. Binary logistic regression problem. Identify the dependence of a binary indicator (probability of outcome) on quantitative and (or) categorical indicators. Resulting attribute: Categorical binary variable. For example, the presence of a disease, the presence of an outcome, or the development of a complication. Factor attributes:

Quantitative (ordinal) variable. For example: age, blood pressure, medication dose, laboratory values.

2) Categorical variables measured on a nominal scale

For example: gender, presence of symptom, presence of risk fact

Class 14. Construction of a survival curve using the Kaplan-Meier method.

Kaplan-Meier method is the method of summarising survival data. Methodology. Examples.

Class 15. Standardization. Direct and Indirect Standardization.

In direct age-adjustment, a common age-structured population is used as standard. This population may actually exist (e.g., population) or may be fictitious (e.g., two populations may be combined to create a standard). In indirect age-adjustment, a common set of age-specific rates is applied to the populations whose rates are to be standardized. The simplest and most useful form of indirect adjustment is the standardized mortality ratio (SMR).

References

1. Aviva Petrie, Caroline Sabin. Visual medical statistics. Textbook for universities. Moscow, GEOTAR-Media, 2015. 168 c.

2. Nasledov A. N31 IBM S P S S Statistics 20 and AMOS: professional statistical analysis of data. - SPb.: Peter, 2013. 416c.

3. Elizabeth De Poy, Laura N. Gitlin; per. from Engl. ed. by V.V. Vlasov. Vlasov. Methods of scientific research in medicine and public health - M.: GEOTAR-Media, 2017. - 432 c.

4. Koichubekov, M. A. Sorokina, A. S. Bukeeva [et al] ; KSMU. Biostatistics in examples and tasks : textbook for universities / B. K.- Almaty : Evero, 2016.

5. Koichubekov B.K. Biostatistics : textbook. -Evero, 2015.

THE ADDITIONAL

6. Grzhibovsky A.M., Ivanov S.V., Gorbatova M.A. Descriptive statistics using the packages of Statistica and SPSS statistical programs: distribution verification // Science and Health. 2016. № 1. C. 7- 23.

7. Grzhibovsky A.M., Ivanov S.V., Gorbatova M.A. Comparison of quantitative data of two independent samples using Statistica and SPSS software: parametric and nonparametric criteria // Science and Health. 2016. № 2. C. 5-28.

8. Grzhibovsky A.M., Ivanov S.V., Gorbatova M.A. Comparison of quantitative data of two paired samples using Statistica and SPSS software: parametric and nonparametric criteria // Science and Health. 2016. № 3. C. 5-25.

9. Grzhibovsky A.M., Ivanov S.V., Gorbatova M.A. Comparison of quantitative data of three and more independent samples using Statistica and SPSS software: parametric and nonparametric criteria // Science and Health Care. 2016. № 4. C. 5-37.

10. Grzhibovsky A.M., Ivanov S.V., Gorbatova M.A. Comparison of quantitative data of three and more paired samples using Statistica and SPSS software: parametric and nonparametric criteria // Science and Health. 2016. № 5. C. 5-29.