

BIostatISTICS

Code: 10211

Main Scientific Area: Mathematics and Statistics

Lecturer: Estela Maria dos Santos Ramos Vilhena

Language of Instruction: Portuguese

Regime: S1

Contact Hours: 60h Total Workload: 100h

ECTS: 6,0

Objectives

Every aspect of daily life is related to the observation and treatment of quantitative data, therefore with the application of statistical methodologies. This situation finds often deficient and even dangerous responses and interpretations, due to the lack of adequate theoretical and methodological knowledge. The statistical work has to be to help plan, obtain, analyze and interpret the data, present the results in order to summarize the information and facilitate the decision-making. Is essential to discover patterns and extract knowledge from sample data and to infer to the population. This course is intended to sensitize the students to the importance of the correct resolution of real problems, providing students with the control of the basic techniques, quantitative methodologies and in the data processing, analysis and inference from this, using statistical software, and using application examples and analysis methods in health area.

Learning Outcomes

Skills to develop: distinguish between population and sample; organize and summarize data from statistical studies; identify and classify variables; decide which measures can be used in different situations, their advantages and disadvantages; create and interpret graphs; understand fundamental concepts of probability; identify the most important probability distributions; estimate and interpret population unknown parameters; perform, interpret and make decisions based on confident intervals and hypothesis tests; identify variables that affect a given response by using correlations and regressions; applying exploratory factor analysis; analyse and interpret data with recourse to the statistical software.

Course Contents

Sample and population.Measurement scales. Charting and graphing. Frequency distribution. Pareto diagram. Parameters and statistics. Measures of location and dispersion. Measures of skewness and kurtosis. Boxplot. Normal Distribution. Independence and covariance.Probability Theory. Sample space. Events.Conditional probabilities.Random variables.Central Limit Theorem.Probability plots.Sampling methods. Estimation. Confidence intervals.Hypothesis testing.Inference errors.Power of thetest.Statistic test.P-value.Parametric tests. Anova. Nonparametric tests.Correlation. Simple and multiple linear regression. Factorial Exploratory Analysis.

Recommended Bibliography

A. Hall, C. Neves, A. Pereira: Grande Maratona de Estatística no SPSS, Escolar Editora, 2011

J. H. Zar: Biostatistical Analysis, Prentice Hall International, Inc.

Maroco, J. (2011); "Análise Estatística com o SPSS Statistics", 6ª Edição, Report Number

Learning and Teaching Methods

Contents: Descriptive Statistics and Inferential Statistics. Sample and population. Different types of data. Data presentation: charting and graphing. Histogram. Pareto graph. Statistics and parameters. Measures of location and dispersion. Boxplot. Measures of skewness and kurtosis. Independence and covariance.

Main Objectives: distinguish between population and sample; organize and summarize data from statistical studies; identify and classify variables; decide which measures can be used in different situations; create and interpret graphs.

Contents: Probability spaces. Sample space. Events. Total probability theorem and Bayes' theorem. Independence of events. Mutually exclusive events. Random variables. Theoretical distributions. Probability plots, Q-QPlot and P-Plot.

Main Objectives: understand fundamental concepts of probability; identify the most important probability distributions. Understand the importance of the Normal distribution

Contents: Sampling methods. Sampling distributions. Central limit theorem. Point estimation. Properties of Estimators. Confidence intervals.

Main Objectives: make a correct inferential statistics; estimate and interpret population unknown parameters.

Contents: Hypothesis Tests. Null hypothesis and alternative hypothesis. Type I and type II errors. Significance level. Power of a statistical test. P-value. Relation between confidence intervals and hypothesis tests. Normality tests. Parametric and nonparametric tests.

Main Objectives: make a correct inferential statistics; properly perform, interpret and make decisions based on confident intervals and hypothesis tests; identify variables that affect a given response.

Contents: Correlation and regression. Scatter plot. Pearson correlation. Coefficient of determination.

Main Objectives: identify variables that affect a given response; forecasting. Contents: Factor Exploratory Analysis

Main Objectives: Factor Analysis is a statistical technique designed to represent a multi-varied random process by creating new variables, derived from the original variables, and generally to a lesser extent, representing the commonality of the process with spurious variables remaining undescribed. by the factorial model.

Assessment Methods

The student will be evaluated by a practical work (PW) and a two partial tests (PT1 and PT2).

The final grade (FG) is given by

$$FG = 40\% PW + 30\% PT1 + 30\% PT2$$

It is further stated that:

The work will be developed by groups 3 elements.

These practical works will be required.

Students who fail (final grade less than 9.5 points) may attend the examination of appeal, having a weight of 60% of the final score, with the remaining 40% obtained by the practical work presented.