

BIostatISTICS

Code: 10211

Main Scientific Area: Statistic

Lecturer: Estela Maria dos Santos Ramos Vilhena

Language of Instruction: Portuguese

Regime: S1

Contact Hours: 65h Total Workload: 95h

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.

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.

Assessment Methods

1. Students enrolled in all 2nd year courses for the first time

UC Final Grade= 85%UC Assessment+15%Project

in Continuous Assessment, 2nd semester Exam Season, and Grade Improvement.

In the 2nd semester Exam Season and Grade Improvement, the Project grade comes from the grade obtained in the continuous assessment.

UC Final Grade = 100% UC Evaluation, in the Special Exam Season and Exceptional Season, if applicable (minimum grade of 7).

Validity of the Project: Continuous assessment and Exam Season of the academic year in which it was carried out.

Assessment of the course (85%)

Continuous assessment system:

75%: two tests (1st and 2nd), weighted 40% and 35% respectively. The minimum mark for the 2nd test is 7 points.

10% Attendance (Attendance at least 80% of classes - 20 points; Attendance between 50% and 80% - 10 points; Attendance of less than 50% - 0 points)

Assessment system for the 2nd-semester exams: an exam with a weighting of 100% in the assessment of the course.

Project (15%) - Completion of the project is compulsory, following the assessment criteria defined for this purpose.

2. Students who are not enrolled in all of the 2nd year courses for the first time are subject to the Methodology mentioned in point 1. However, these students do not carry out a project, making it compulsory to carry out a substitute assignment. The decision to carry out this work must be communicated to the teacher of the respective course by 04.03.2024. If this is not communicated, it is assumed that the student does not intend to do it.