

STATISTICS

Degree in Finance

Degree in Computer Systems

Degree in Computer Systems

Degree in Electrical and Computer Engineering

Code: 10202

Main Scientific Area: Statistic

Lecturer: Estela Maria dos Santos Ramos Vilhena

Language of Instruction: Portuguese

Regime: S2

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, and therefore with the application of statistical methodologies. This situation finds often deficient and even dangerous responses and interpretations, frequently due to the lack of adequate theoretical and methodological knowledge. Thus, the statistical work has to be to help plan, obtain, analyze and interpret the data and present the results in order to summarize the information and facilitate the decision-making. It becomes essential to discover patterns and extract knowledge from sample data and to infer to the population. The course is intended to sensitize the students to the importance of the correct resolution of real problems that nowadays.

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 simple regressions.

Course Contents

Introduction. Objectives. Descriptive Statistics and Inferential Statistics. The Statistical Method. Descriptive Statistics. Sample and population. Different types of data. Measurement scales: nominal, ordinal, interval and scale. Data presentation: charting and graphing. One-dimensional distributions. Frequency distribution of discrete and continuous variables. Observed and cumulative frequencies. Graphical representation of frequency distributions. Differential and integral diagrams. Histogram. Parameters and statistics. Measures of location. Arithmetic mean, median and mode. Quantiles. Measures of dispersion. Interquartile range. Mean absolute deviation, variance and standard deviation. Coefficient of variation. Measures of skewness and kurtosis. Boxplot. Normal Distribution. Relationship between standard deviation, interquartile range and outliers in data approximately normal. Probability Theory. Random experience. Probability spaces. Sample space. Events. The axioms of the theory of probability. Conditional probabilities. Total probability theorem and Bayes' theorem. Independence of events. Incompatible events. Random variables. Distribution function. Discrete and continuous random variables. Probability and probability density functions. Parameters of random variables. Theoretical distributions. Binomial Distribution. Hypergeometric distribution. Poisson distribution. Normal or Gaussian distribution. Central Limit Theorem. Probability plots, Q-Q Plot and P-P Plot. Sampling methods. Random and nonprobability samples. Simple random, systematic, stratified and

clustersampling. Convenience and quota sampling. Estimation. Point estimation. Estimator and estimate. Properties of estimators. Confidence intervals. Definition and interpretation. Confidence intervals for means, proportions and variances. Hypothesis testing. Null hypothesis and alternative hypothesis. Simple and composite hypothesis. Unilateral and bilateral tests. Inference errors. Relationship between the two types of errors. The significance level. Power of the test. Methodology. Statistic test. Decision rule. P-value. Relationship between confidence intervals and hypothesis testing. Normality tests. Correlation and simple linear regression: Scatterplot. Pearson's correlation coefficient. Coefficient of determination.

Recommended Bibliography

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

CAST, Computer-Assisted Statistics Textbooks, http://cast.massey.ac.nz/collection_public.html

Reis, E.; Melo, P.; Andrade, R.; Calapez, T. (2001); "Estatística Aplicada" – Vol 1 e 2, 4ª Ed, Edições Sílabo

A. Robalo: Estatística – Exercícios – Vol 1 e 2, Edições Sílabo

Learning and Teaching Methods

The presentation of practical examples using appropriate software, together with the presentation of dynamical and interactive graphs and diagrams, enables a permanent discussion in the classroom, allowing students to acquire the skills and achieve the desired objectives: motivate the students towards problem resolution that nowadays tend to have a global scope and that just can be explained and solved applying an holistic perspective, providing students with the control of the main quantitative methodologies and techniques in the treatment and analysis of data and inference from these.

Assessment Methods

EEC Course

Continuous Assessment

two partial tests (T1 and T2);

Group work (TG).

Final grade (NF)

$NF=20\%TG+40\%T1+40\%T2$

1. Minimum mark in the second test: 7 points.

2. Minimum mark in group work: 10 points

3. Group work is compulsory for all exam periods.

Assessment Exam (any period)

exam (E);

Group work (TG).

The final grade (NF)

$$NF=20\%TG+80\%E$$

1. exam: minimum mark of 7;
2. group work: minimum mark of 10;
3. Compulsory group work, carried out during the continuous assessment period;
4. Failure to complete the group work implies failure to pass the course.

GE course

1. comprehensive test (TG);
2. interest, participation and commitment (A), a minimum grade of 10, otherwise they fail the continuous assessment and may go on to one of the exam periods.

The Final Grade (NF) in continuous assessment:

$$NF= \text{Maximum (75\% TG + 25\% A, TG)}$$

Appeal: single exam (100%)

Finance Course

1. enrollment in all 1st year courses for the first time

UC Final Grade = 80% UC assessment + 5% attendance + 15% Multidisciplinary Project, in Continuous Assessment, 2nd semester Exam Period and Grade Improvement. In the 2nd semester Exam Season and Grade Improvement, the Project grade comes from the grade obtained in the continuous assessment.

Final UC grade = 100% UC grade, in the Special Exam Season and Exceptional Season, if applicable.

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

Assessment of the course (80%):

. continuous assessment: completion of three tests: 20%, 25% and 35% respectively. The minimum mark for the 3rd test is 7.

. exam period: one exam with a weighting of 100%.

Attendance (5%):

. According to the established criteria.

Project (15%): compulsory. Compulsory attendance at scheduled Skills.

2. If you are not enrolled in all the 1st year courses for the first time, point 1 applies. Students who do not complete a

project must do substitute work, a decision communicated on the set date.

3. TE status: point 1 applies. They may choose to carry out the project or substitute work, the decision to be communicated on the set date. Opting for the project requires attendance at Skills.

4. Exceptional cases: students who do not carry out the project/replacement work:

Continuous Assessment: one element of the assessment is considered missing; 2nd semester exams and/or grade improvement: zero is considered in the component of the assessment relating to the replacement project/work. Maximum Final Grade: 85% of the UC assessment grade.

ESI course (L and PL)

Continuous assessment

Three tests (3rd test: minimum grade 7): 80% of the final grade, resulting from the arithmetic mean.

E - Exam (appeal, special, other)

An exam which accounts for 80% of the final grade.

TP - Peer work

Three assignments carried out in class: 20% of the final grade and compulsory for all students.

** Exemption: students with status or with justified overlap.

UC final classification

Failure to complete any component will result in a mark of zero.

The classification of the TP component is carried over to each of the periods.

The assessment methodology is the same for grade improvement.