Universidad Zaragoza

Academic Year/course: 2024/25

30207 - Statistics

Syllabus Information

Academic year: 2024/25
Subject: 30207 - Statistics
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
326 - Escuela Universitaria Politécnica de Teruel
Degree: 439 - Bachelor's Degree in Informatics Engineering
       443 - Bachelor's Degree in Informatics Engineering
ECTS: 6.0
Year: 1
Semester: Second semester
Subject type: Basic Education
Module:

1. General information

The objective of the subject is that the student learns statistical techniques for data collection, presentation and treatment , as well as the drawing of conclusions from the information provided. In addition, the student learns to model real situations in the presence of uncertainty. The student integrates the knowledge acquired in the subject in the formative context of the degree to be self-sufficient in the use of statistical techniques in the development of their professional work.

2. Learning results

Handle the fundamentals of probability calculus and techniques in relation to probability distributions to identify the stochastic structure underlying the behavior of a real system.

Apply statistical data processing and analysis techniques to extract knowledge from the data.

Use computer programs for data processing.

Raise and interpret hypothesis testing as a solid support to the decision making process.

Prepare a statistical report that presents the problem under study, analyze the results critically, and propose recommendations in understandable language for decision-making.

Identify and formulate optimization problems within the framework of Statistical Inference.

3. Syllabus

A. EXPLORATORY DATA ANALYSIS

1. Exploratory analysis of a variable. Numerical measurements and graphical representations.

2. Fit of distributions and goodness-of-fit test.

3. Exploratory analysis of several variables. Linear regression.

B. MODELS OF PROBABILITY DISTRIBUTIONS

1. Calculation of probabilities. Bayes and total probability theorems. Independence of events.

2. Discrete and continuous random variables. Momentum, hope, variance and other measures. Chebychev inequality.

3. Discrete and continuous probability distributions: Bernoulli, binomial, hypergeometric, geometric, negative binomial, Poisson and Poisson process, uniform, exponential, gamma and normal.

4. Multivariate probability models. Variable independence. Sum of variables. Reproductive property. Central limit theorem.

C. SAMPLING, ESTIMATION AND HYPOTHESIS TESTING

1. Sampling. Statistics and distribution. Pearson's chi-square, Student's t and Fisher's F distributions. Theorem of Fisher.

2. Point estimate. Maximum likelihood and methods of moments. Confidence interval.

3. Hypothesis testing. Null and alternative hypothesis. Errors. Level of significance. Power.

4. Academic activities

Lectures: 30 classroom hours.

Theoretical-practical sessions in which the contents of the subject are explained.

Problems and cases: 15 classroom hours.

Sessions to solve examples and exercises in small groups (2 subgroups).

Computer laboratory practices: 15 face-to-face hours (7 sessions in subgroups).

Real and simulated data processing sessions, using specific statistical software, in small groups (4 subgroups).

Teaching assignments: 15 non-attendance hours.

Completion of a statistical report with real and/or simulated data directed by the teacher.

Personal study: 70 hours

Assessment tests. 6 hours

5. Assessment system

The subject will be assessed by the continuous assessment system by means of the following activities:

1. Individual test of the module Models of Probability Distributions (40% of the overall grade, minimum grade required 4.5 points out of 10). This test can be taken during the course in an intermediate test before the regular; students who do not pass the module in the intermediate test must take the latter.

2. Individual test of the module Sampling, Estimation and Hypothesis Contrasts (30% of the overall grade, grade minimum required 4.0 points out of 10). It is held on the day of the regular meeting.

The average of the scores of tests 1 and 2 must average 5 points out of 10.

3. Individual test of the contents of the practices carried out in the computer laboratory (15% of the overall grade, minimum grade required 5 points out of 10). It is carried out on the day of the ordinary meeting.

4. Presentation of a statistical report carried out in group using real and simulated data (15% of the global grade , minimum required grade 5 points out of 10). The report is made during the course and is due on the day of the ordinary call.

The extraordinary call is similar to the ordinary call for those students who do not pass the subject in the ordinary call.

6. Sustainable Development Goals

4 - Quality Education
8 - Decent Work and Economic Growth