Universidad Zaragoza

25209 - Statistics

Syllabus Information

Academic year: 2023/24
Subject: 25209 - Statistics
Faculty / School: 201 - Escuela Politécnica Superior
Degree: 571 - Degree in Environmental Sciences
ECTS: 6.0
Year: 2
Semester: First Four-month period
Subject type: Basic Education
Module:

1. General information

The subject deals with the study of Statistics oriented to its application to Environmental Sciences.

In particular, Statistics provides essential tools for understanding, predicting and controlling environmental phenomena and their impact, preparing students for management and decision-making in this field.

The objectives of the subject are:

- Understand Statistics and Probability, their applications and potential in environmental analysis
- Know and apply basic principles of Statistics and Probability.
- Learn to analyse environmental data using statistical techniques and computer tools
- Interpret results and prepare reports suitable for scientific communication.
- Appreciate the need and usefulness of statistics in professional practice.

All the training provided by this subject contributes transversally to AGENDA 2030 and SDGs. In particular, potential applications related to the SDGs are illustrated: 7 (Affordable and clean energy), 9 (Industry, innovation and infrastructure) and 13 (Climate action).

2. Learning results

Be able to:

- Use descriptive statistical tools.
- Recognize the most common probability distributions.
- Apply basic estimation techniques and contrasts to different environmental problems.
- Handle statistical and office software.
- Work in groups as well as write a report and present and defend the work done.

3. Syllabus

MODULE I: INTRODUCTION TO STATISTICS

- Topic 1. Introduction and Fundamental Concepts.

MODULE II: DESCRIPTIVE STATISTICS

- Topic 2. Numerical and graphical summaries for one-dimensional variables.
- Topic 3. Numerical and graphical summaries for two-dimensional variables.

MODULE III: CALCULATION OF PROBABILITIES

- Topic 4. Introduction to the calculation of probabilities.
- Topic 5. Random variables.

MODULE IV: STATISTICAL INFERENCE

- Topic 6. Point and interval estimation.
- Topic 7. Hypothesis testing.
- Topic 8. Other statistical techniques: Linear Model, ANOVA.

4. Academic activities

Master classes: 30 hours.

Problem solving and case studies with specific software: 30 hours.

Tutored work: 20 hours.

Personal study: 64 hours.

Assessment activities: 6 hours

The subject divides its 6 credits into 3 ECTS in a complete group of theory explanation and type examples that motivate its usefulness in the field of Environmental Sciences. The other 3 ECTS are aimed at developing skills in approaching, modelling and solving problems that resemble real situations, divided into practical computer work and theoretical exercises.

5. Assessment system

The learning path sequenced throughout the semester includes tests and activities that contribute to the overall grade for the subject.

The **continuous evaluation** consists of three parts:

I.	Computer-based written test of Modules I and II, Introduction and Descriptive Statistics, on the one hand (20% of the final grade) and Module III of Calculus of Probabilities (20% of the final grade). The evaluation of both parts is done jointly, but a minimum grade of 3.5/10 is required in each of the two parts.
II.	Computer-based written test of Module III of Statistical Inference, with a weight of 30% in the final grade. A minimum grade of 3.5/10 is required.
III.	Completion of a written report on the application of the techniques seen in the subject applied to a set of data (30% of the final grade). Evaluating the maturity of the writing, its appropriateness for scientific communication and the correct use of statistical techniques on a data set.

Students who do not achieve the minimum grades in the written tests must take an **overall evaluation test**

A final grade of at least 5/10 is required to pass the subject. If the minimum required in any part is not reached , the final grade will be Fail and the numerical grade will be the minimum between 4.5 and the final grade.

The success rate of the subject in the last three years is:

2019/2020 = 95,83%; 2020/2021 = 100%; 2021/2022 = 91,30%.