PhD students, future researchers, often need to analyze different types of data collected in the development of their research. They need to identify the statistical techniques to be used, depending on the type of data and the objective pursued with their analysis. To this end, an overview will be given of the different existing statistical tools, their purposes, the problems they solve and their usefulness for the development of research in all areas in which data must be analysed: social sciences, economics, engineering, earth sciences, etc.

The approach of this course is to show, for these statistical techniques, their usefulness and limitations, seeing with practical examples their application. The different tools (each of which alone deserves its own course) are not going to be seen in depth, but the course has an objective of information and introduction. Some of the software available for data analysis will also be reviewed.

5. Course Outline

PhD students, future researchers, often need to analyze different types of data collected in the development of their research. They need to identify the statistical techniques to be used, depending on the type of data and the objective pursued with their analysis. To this end, an overview will be given of the different existing statistical tools, their purposes, the problems they solve and their usefulness for the development of research in all areas in which data must be analysed: social sciences, economics, engineering, earth sciences, etc.

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6. Recommended Prior Knowledge

Knowledge of basic statistical concepts on probability theory, distributions and inference. The required level is that corresponding to a university course in statistics of at least 4 credits.
8. Syllabus

1. Obtaining information and data
   1. 1.1 Sampling techniques
   2. 1.2 Design of experiments
2. Statistical software for research
   1. Commercial packages: SPSS and Statgraphics
   2. Free software: R
3. Description and basic data analysis
   1. Numerical description techniques
   2. Graphic description techniques
   3. Basic statistical tests
4. ANOVA and Regression
   1. Introduction
   2. ANOVA of a factor. Kruskal-Wallis test
   3. Simple linear regression. Model, hypothesis and diagnosis
   4. Introduction to Multiple Linear Regression
5. Classification techniques
   1. Introduction
   2. Logistical Regression
   3. Discriminant analysis
   4. Cluster analysis
6. Factorial Analysis
   1. Introduction
   2. Aims and Objectives
   3. What is a factor?
   4. Unmasking the factors: preliminary analysis and adequacy
   6. Interpreting the meaning of the factors: rotation
   7. Final Considerations
7. Time Series Analysis
   1. Introduction
   2. ARIMA Models
   3. Box-Jenkins Methodology
8. Extreme Value Statistics
   1. Fundamental concepts in parametric statistics
   2. Basic theory of extreme values
   3. Parameter estimation methods
   4. Parametric model selection
   5. Uncertainty analysis

9. Teaching and Learning Methodologies

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10. Assessment

(*) This page is an automatically translated version of the original language version, which has been approved by the UPV for official purposes.
### 9. Teaching and Learning Methodologies

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### 10. Assessment

**Outline**

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