

Informatics Tools for Statistics

Code: 104849
ECTS Credits: 6

Degree	Type	Year	Semester
2503852 Applied Statistics	FB	1	1

Contact

Name: Joaquim Roe Vellve
Email: Joaquim.Roe@uab.cat

Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Other comments on languages

This document is a translation of the Catalan original. In case of inaccuracies or errors, the Catalan version is the valid, official, guide for the course.

Teachers

Albert Ruíz Cirera
Sundus Zafar
Joan Gasull Jolis

Prerequisites

Because it is an undergraduate and in the first semester, it has no prerequisite.

Objectives and Contextualisation

The main objectives of the subject are the following:

- Familiarize yourself with the use of an algebraic and calculating manipulator. This manipulator must be considered as a common tool when studying the rest of the subjects.
- Learn how to structure and write scientific texts with the LaTeX word processor.
- Familiarize yourself with the concept of statistical package. In particular, create and transform databases and get used to work environments in graphic mode and command line.
- Learn how to use a command line operating system, taking advantage of the power of current computers to merge, separate or extract data from files or file sets.
- Introduce yourself to the formalization of algorithms using a programming language.

Competences

- Make efficient use of the literature and digital resources to obtain information.
- Select the sources and techniques for acquiring and managing data for statistical processing purposes.

- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Use quality criteria to critically assess the work done.
- Use software for statistical analysis, numerical and symbolic analysis, graphic visualisation, optimisation or others, to solve problems.

Learning Outcomes

1. Correctly identify the types of data and measurements.
2. Critically assess the work done on the basis of quality criteria.
3. Identify the advantages and disadvantages of the internet as a major source of information in statistics.
4. Make effective use of references and electronic resources to obtain information.
5. Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
6. Use programming languages related to statistical applications competently.
7. Use science editors to present papers, problems, reports and scientific texts in general.

Content

1. Introduction to computing: History of computing and the Internet. Functioning of classrooms.
2. Textprocessor (LaTeX): Localization of the software. Structure of a TeX file.
3. Statistical packs (R): Work environments. Declaration of variables. Creation, obtaining and manipulation of databases. Descriptive tools Graphic environment.
4. Computer Algebra System (Sage): numerical and algebraic calculations. Function graphs. Resolution of equations. Definition of functions. Lists, sets and successions. Logical programming, iterations and procedures.
5. Operating system (Bash): graphic environment. The console First instructions and obtaining help. Manipulation of files. Data manipulation: regular expressions, grep and awk.
6. Programming (Python): Introduction to Python.

Methodology

The practical classes are held in computer rooms or classrooms prepared for the use of laptops.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Practice sessions	48	1.92	2, 7, 1, 3, 5, 6, 4
Preparación del examen de sistema operativo	20	0.8	2, 1, 3, 5, 6, 4
Type: Autonomous			
LaTeX document preparation	10	0.4	2, 7, 3, 4
Preparation of the computer algebra system	20	0.8	2, 1, 3, 5, 6, 4
Preparation of the statistical package exam	20	0.8	2, 1, 3, 5, 6, 4
Python program elaboration	20	0.8	2, 1, 3, 5, 6, 4

Assessment

The continuous evaluation allows to obtain a mark of the subject. A space of 4 hours is reserved to evaluate again the exams not passed of the continuous evaluation.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Computer algebra system exam	0.26	3	0.12	2, 7, 1, 5, 6, 4
Final exam	0.68	4	0.16	2, 1, 3, 5, 6, 4
LaTeX document delivery	0.13	0	0	2, 7, 3, 5, 4
Operating system exam	0.17	2	0.08	2, 1, 3, 5, 6, 4
Python program delivery	0.22	0	0	2, 1, 3, 5, 6, 4
Statistic package exam	0.22	3	0.12	2, 1, 3, 5, 6, 4

Bibliography

As this subject is done in computer rooms, the main source of information will be the *help* of the programs that are used. In addition, as a complementary bibliography we recommend the following online resources.

- Tobias Oetiker, Hubert Partl, Irene Hyna and Elisabeth Schlegl. The not so short introduction to LaTeX2E (or LaTeX in 139 minutes). <https://tobi.oetiker.ch/lshort/lshort.pdf>
- W.N. Venables, D.M. Smith and the R Development Core Team: An introduction to R. <https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf>
- GNU Bash manual, <https://www.gnu.org/software/bash/manual/>
- Guido van Rossum, Fred L. Drake, Jr., editors, The Python Language Reference, <http://marvin.cs.uidaho.edu/Teaching/CS515/pythonReference.pdf>
- The Sage Reference Manual, <https://doc.sagemath.org/html/en/reference/>