Universitat Pompeu Fabra Barcelona

Curs Acadèmic: 2025/26

26463 - Modern Statistical Computing

Informació de la Guia Docent

Curs acadèmic: 2025/26

Centre acadèmic: 304 - Facultat de Dret i Facultat d'Economia i Empresa
332 - Facultat d'Economia i Empresa

Estudi: 3327 - Grau en Estudis Internacionals d'Economia i Empresa/International Business Economics

Assignatura: 26463 - Modern Statistical Computing

Crèdits: 5.0

Curs: 3 i 4

Idiomes de docència:

Teoria:	Grup 1: Anglès
	Grup 2: Anglès
Seminari:	Grup 101: Pendent
	Grup 102: Pendent

Professorat: David Rossell Ribera, Vladimir Zaiats Protchenko

Periode d'Impartició: Segon trimestre o Quart Trimestre

Presentació

Statistical computing is a highly sought-after analytical data analysis skill both in professional and research environments. This course presents modern graphical displays and data manipulation methods, interactive and reproducible reporting, emphasizing statistical methods and computation related to regression and classification methods such as linear, generalized linear and non-linear models. The concepts are introduced in **R (**https://www.r-project.org**),** one of the leading programming languages for statistical computing. Knowledge of R is highly-valued by companies in many sectors for positions related to data science, quantitative analysis or finance. R is also an indispensable tool in most research fields, including Economics, Finance, Marketing, Biomedicine, etc. R provides a rich set of off-the-shelf data analysis tools, and the possibility to design our own data processing and analyses. R runs in all operating systems (Windows, Mac, Unix-like) and is a free open-source language that is enhanced by an extensive list of user-contributed packages.

The purpose of this course is to introduce students to statistical computing, including flexible regression data analysis methods, and to advanced R skills. The idea is that students learn by doing. Therefore there is a strong applied emphasis, all concepts are driven by examples discussed in class, where students are given the code to reproduce them. Students will become skilled in applications of elementary statistical methods, with an emphasis on data exploration, graphics and programming. Focus will also be placed on opportunities to enhance the learning experience in other statistical courses.

Resultats d'aprenentatge | Resultats d'aprenentatge específics

At the end of the course, students will have learned

- To use a fundamental data analysis tool for quantitative analytical methods
- Programming, data handling, exploratory data analysis, linear / generalized linear/ non-linear regression, summarizing data, effective graphics, model-free computational methods (bootstrap, permutation tests, cross-validation)
- Preparing notebooks to automatically perform quantitative analyses and create reports in formats such as pdf and html, with interactive elements

Continguts

1. Introduction to R, RStudio and R markdown
2. Graphical displays (ggplot)
3. Data manipulation
4. Programming basics
5. Statistical models: linear, generalized linear and non-linear models. Optimization
6. Computational inference methods: bootstrap, permutation tests, cross-validation
7. Model comparison techniques
8. Advanced plots: animated plots, maps, interactive plots, dashboards

Sistema d'avaluació i qualificació

1. Homework + contribution to class (20%)
2. Controls: in-class exercises (40%)
3. Final Project (40%)

The final project (in groups of 2 students) requires the submission of a report of up to 10 typed pages (not counting appendices).

Students will select their projects from topics of their own interest (upon the acceptance of the instructors) and will make a brief oral presentation at the end of the course

Absence Policy

Attending class is mandatory and will be monitored by professors. The impact of absences on the final grade is as follows:

Absences	**Penalization**
Up to two (2) absences	No penalty
Three (3) absences	1 point subtracted from final grade (on a 10 point scale)
Four (4) absences	2 points subtracted from final grade (on a 10 point scale)
Five (5) absences or more	The student receives an INCOMPLETE for the course