Universidad
Carlos III de Madrid

PROGRAMME

1. **INTRODUCTION TO R.** Getting started. Basic elements of **R**. Packages. Data structures: vectors, matrices, lists, and data frames. Functions class() and str(). Attach(), detach(), and with(). Syntax and operators.

2. **DATA MANAGEMENT WITH R.** Creating, recoding, and renaming variables. Missing values. Date values. Sorting, merging and sub-setting data sets. Importing data from text and Excel files. Exporting data to text and Excel files. Web-scraping. Functions for working with data objects. Control flow: loops and conditionals. User-written functions.

3. **PLOTS WITH R.** Working with graphs: creating and saving plots. Graphical parameters: symbols, lines, colors, and text. Adding text, customized axis and legends. Text annotations. Basic graphs: bar-plots, pie-charts, histograms, and box-plots. Scatterplot matrices.

4. **BASIC STATISTICS WITH R.** Descriptive statistics. Frequency tables. Correlations.

5. **MATRICES WITH R AND EXCEL.** Applying **R** functions to matrices and data frames. Matrices with **R**. Matrices with Excel.

BASIC BIBLIOGRAPHY

Kabacoff, R. L. (2015). *R in action: Data Analysis and Graphics with* **R**, 2nd Edition, Manning Publications.

ADDITIONAL BIBLIOGRAPHY

James, G., Witten, D., Hastie, T., and Tibshirani, R. (2013). *An Introduction to Statistical Learning with Applications in* **R**, Springer Verlag.