

Analytic tools

Professor: Mercè Roca i Puigvert / Daniel Serra
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Course Description

The course introduces the basic concepts of data analysis and statistics. It provides a review of the main tools used for data description and how to perform basic statistical analysis. The course is self-contained and requires only a minimal mathematical knowledge for data processing and data analysis, which is also reviewed.

The course is open to all students who require preparation for the analytic and quantitative modules of the master. It is addressed to those students with a low quantitative and mathematical background or to those who need to "refresh" their knowledge. It is also recommended to students with little knowledge on the use of Microsoft Excel worksheet. It includes a first block devoted to statistics and data analysis and a second block of quantitative tools. In the second block students will be introduced to business modelling and basic mathematical tools, the use of functions and add-ins such as Solver, and how to draw graphs and functions.

Methodology

The course is introductory and aimed to provide students the main concepts and basic knowledge of the techniques and tools used in statistical and quantitative analysis. The course features little math. Data sets will be used to illustrate the applications and limitations of each technique covered by the course. A special emphasis will be put on applicability and result interpretation. There will be intermediate exercises as well as a final wrap-up test so that all students have an account of the learning outcomes of the course.

Evaluation criteria

Students will have to take a final test done via ecampus.

Calendar and Contents

The course is composed of 2 blocks: “Block 1: Statistical tools for data analysis” taught by Dr. Mercè Roca and “Block 2: Quantitative tools” taught by Dr. Daniel Serra.

The course will have 3 hours of teaching for each block (check the program calendar) and additional material to be autonomously reviewed by students.

The following are the contents of the 2 blocks:

BLOCK 1: Statistical tools for data analysis

- 1. Introduction to statistics and data analysis**
 - 1.1. Uses of statistics
 2. Basic concepts
 3. Questionnaire design
 4. Types of statistical analysis
 5. Software for statistics
- 2. Descriptive analysis of quantitative data**
 - 2.1. Data presentation
 - 2.2. Plotting data
 - 2.3. Descriptive statistics
 - 2.3.1. Centrality measures
 - 2.3.2. Dispersion measures
 - 2.3.3. Measures of interrelation amongst 2 quantitative variables
 - 2.4. Regression analysis
 - 2.5. Longitudinal data: index numbers
- 3. Descriptive analysis of qualitative data**
 - 3.1. Presentation of data
 - 3.2. Descriptive statistics
 - 3.3. Contingency tables
- 4. Statistical inference**
 - 4.1. Inferential statistics
 - 4.2. Sampling
 - 4.3. Sampling techniques
 - 4.4. Sample size and margin of error
 - 4.5. Sampling distributions
 - 4.6. Estimating confidence intervals

BLOCK 2: Quantitative tools

Part 1: Quantitative Business Modeling

1. Decision Making and Quantitative Modeling
2. Quantitative business modeling
3. The modeling procedure
4. Detailed Modeling
5. Software for modeling

Part 1 Activities:

- Read carefully chapter 1, *introduction to Quantitative Analysis*. You can use the powerpoint *introduction to decision models*, that goes with the book.

Documents: [Installing solver add-in in excel for MAC](#)

Part 2: Optimization and Mathematical Programming

1. The modeling procedure
2. Linear programming
3. Solving problems with excel
4. Extensions

Part 2 Activities:

- Read carefully chapter 7, *introduction to Linear Programming, sections 7.1 to 7.8*. You can use the powerpoint *linear programming ppt*, that goes with the book. Only excel with the solver add-in will be used to solve the problems (Do not use QM for Windows)

Documents:

[Linear programming solving graphically in excel](#)

[Linear programming solving with excel solver](#)

Part 3: Decision Analysis

1. The decision analysis situation
2. Decisions under certainty
3. Decisions under uncertainty
4. Decisions under risk
5. Decision trees

Part 3 Activities:

- Read carefully chapter 3, *Decision Analysis, sections 3.1 to 3.5*. You can use the powerpoint *decision analysis ppt*, that goes with the book. Only excel with the solver add-in will be used to solve the problems (Do not use QM for Windows)

Reading Materials/ Bibliography/Resources

The class slides and explanatory videos and readings for each topic will be available on the e-campus.

Selected readings:

MOORE, McCABE, CRAIG. Introduction to the Practice of Statistics. Freeman Ed.
CURWIN, SLATER, EADSON. Quantitative methods for business decisions (7th ed.). Andover: Cengage Learning.
MALHOTRA. Marketing Research. An Applied Orientation (5th ed.). Pearson Prentice Hall.
STEVEN TADELIS . Game Theory: An Introduction. Princeton University Press. 2013.

Bio of Professor

Mercè Roca i Puigvert is the Academic Director of the MSc in International Business. She obtained her PhD from Leeds University Business School and a Master degree in Economics and Management from Universitat Pompeu Fabra. She is a member of the Research in International Studies and Economics (RISE) at ESCI-UPF, the Experimental Economics Lab (BESLab) research group, and the Business Analytics Research Group (BARG) at UPF. She is lecturer of Statistics and Marketing Research Analytics. She is author of numerous articles and book chapters linked to international business, market research and decision making.

For more info visit my [website](#)

Daniel Serra graduated in 1984 in Economics from the Autonomous University of Barcelona, and obtained a Master's Degree in Systems Analysis and his PhD in the Whiting School of Engineering at Johns Hopkins University in 1989. He is currently professor of management in the department of Economics and business at the Universitat Pompeu Fabra (UPF). His fields of specialization are logistics and quantitative methods in management. He has more than 30 publications in international journals, such as European Journal of O.R., Computers and O.R., Journal of the Operational Research Society, Network and Spatial Economics, Journal of Regional Science, Geographical Analysis, Papers in Regional Science, among others. He belongs to the editorial board of Geographical Analysis, International Journal of Regional Science, Supply Chain Practice, and International Journal of Operations Research and Information Systems. He has worked in consulting for several firms and institutions in the implementation of quantitative models for decision making. He has been vicerector of the UPF from 2001 to 2013, and Dean of the UPF Barcelona School of Management (2013-2018). He is currently the chairman of Department of Economics and Business at UPF.

More info: www.danielserra.es