University of Ferrara

DEPARTMENT OF ECONOMICS & MANAGEMENT

STATISTICS FOR ECONOMICS AND BUSINESS

Second level degree

"Economics Management and Policies for Global Challenges"

Curriculum:

Small and medium enterprises (SMEs) in International Markets

96 hours, 12 credits

Prof. STEFANO BONNINI, Email address: stefano.bonnini@unife.it

Prof. VALENTINA MINI, Email address: valentina.mini@unife.it

Prof MINI

She is Adjunct Professor,
University of Ferrara at the:
Department of Mathematics and
Department of Economics and Management.

She has been Adjunct Professor at:
USI - Università della Svizzera Italiana
Franklin University (Lugano, CH)

She has been Visiting Professor at the
University of Manchester (UK).

She is consultant in Evaluation of Public Projects
(For.Te, Fondoprofessioni, INTERREG IT-SLO)

Contatti: valentina.mini@unife.it

Write an e-mail to have an appoinment
during office hours: Monday 12-14

The students

Why did you select Statistics in your academic curriculum?
What do you expect from this course?
What do you think will be your main problem to deal with?

Teaching materials

Lecture notes

Material provided by the Professors, available at

www.unife.it/economia/lm.economics/lectures/statistics-for-economics-business

Suggested Textbooks:

Mardia K.V., Kent J.T., Bibby J.M.
«Multivariate Analysis»
Academic Press, London
Edited in 2000 or later

Anderson T.W.
«An introduction to Multivariate Statistical Analysis»
Wiley
Edited in 2003 or later

1. **An *introduction to multivariate statistical analysis**

By: Anderson, Theodore Wilbur. Hoboken : Wiley. [2003]. XX, 721 p. 24 cm. Language: English, Database: BiblioFE

Argomenti: ANALISI MULTIVARIATA

BiblioFe Esporta in Mendeley, Endnote ecc.

Libro

Luogo	N° collocazione	Stato
Economia	TL 519. 535 ANDETWint	Documento per sola consultazione interna

3. **Multivariate analysis**

By: Mardia, Kantilal Varichand. London \etc.! : Academic press. 1979. XV, 521 p. 23 cm. Language: English, Database: BiblioFE

BiblioFe Esporta in Mendeley, Endnote ecc.

Libro

Luogo	N° collocazione	Stato
Economia	TL 519. 53 MARDKVmul	Documento per sola consultazione interna

Università degli Studi di Ferrara

Economics Management and Policies for Global Challenges

Servizi Online | Rubrica | Accedi

Cerca nel sito

Home | Lectures | Organization | Quality Assurance | Where we are and Contacts | International | Double degree | orario lezioni |

A.A.2018/2019

- Statistics for economics and business
- Materiale didattico 2018/2019
- Statistic for economic and business

Statistics for economics and business

Fall semester program

When		Where	What
day	*time*		*topic*
24 sept 19	12,00-15,00	A7	Introduction: topics, course's structures and R
8 oct 19	12,00-15,00	A7	Matrix algebra for multivariate problems
9 oct 19	9,00-12,00	A7	Probability and Inference concepts for Regression Analysis
15 oct 19	12,00-15,00	A7	Simple linear regression: introduction
16 oct 19	9,00-12,00	A7	Simple Linear Regression: interpretation
22 oct 19	12,00-15,00	A7	Simple Linear Regression: practical issues
23 oct 19	9,00-12,00	A7	Practicing ourselves: Lab and exercises
29 oct 19	12,00-15,00	A7	Multiple Linear Regression: introduction and interpretation
30 oct 19	9,00-12,00	A7	Multiple Linear Regression: practical issues
5 nov 19	12,00-15,00	A7	MLRM: Lab and exercises
6 nov 19	9,00-12,00	A7	Cluster analysis: Hierarchical Cluster
12 nov 19	12,00-15,00	A7	Hierarchical Cluster: interpretation and practice
13 nov 19	9,00-12,00	A7	Non Hierarchical Cluster: theoretical introduction
19 nov 19	12,00-15,00	A7	Non Hierarchical Cluster: interpretation and practice
20 nov 19	9,00-12,00	A7	Practicing ourselves: Lab and exercises
26 nov 19	12,00-15,00	A7	First Step Course's Overview

Lectures' structure

4 main parts:

-Theory
-Examples / Case studies
-Practice
-Workout using R (lab)

→*Additional reading will be suggested*

→*For the workout we'll use our datasets;*
you may use a personal database (please, before to install it ask to the professor)

Lectures' structure

Time's organization (proposal):

Tuesday (12-15)
First part =12.15-13.30
Coffee break = 13.30-13.45
Second part = 13.45-15.00

Wednesday (9-12)
First part =9.15-10.30
Coffee break = 10.30-10.45
Second part = 10.45-12.00

Final exam

The central part of your exam is a Written test:

STRUCTURE: Multiple choice questions (15 questions;1 hour)

CONTENTS:

- Theoretical questions
- Applied problems
- R commands

Written test MARK = calculated as the sum of your scores:

+2 for each Right answer

-1 for each Wrong answer

0 points for each Missing answer

FINAL MARK:

a) Written Test Mark

b) **Practical assignment/presentation** based on a given dataset, challenging economics' or business' problems (you'll get max +3 points on the final mark, that must be greater than or equal to **18!!!!)**

INTRODUCTION TO THE DATABASES

Passito

A marketing survey on the demand of the wine «Passito» has been performed.

A sample of n=386 people has been interviewed. The questionnaire includes several questions about their preferences and behaviors related to drinking wine.

Dataset variables:

Label	Description	Coding
ID	Personal ID of the interviewed	Increasing integer number
AgeClass	Age of the person	Age (years)
AGE_CLASS	Age class of the person	1-6
SEX	Sex of the person	M or F
PROV	Province where the interviewed lives	Province code
LIKE_WINE	How much do you like drinking wine?	Integrer number from 1 to 7
FREQ_HOME	How often do you drink wine at home with meals?	Integrer number from 1 to 5
FREQ_BAR	How often do you drink wine in bars/pubs?	Integrer number from 1 to 5
FREQ_REST	How often do you drink wine at restaurants with meals?	Integrer number from 1 to 5
KNOW_PAS	Do you know the wine Passito?	Integrer number from 1 to 7
FREQ_PAS	How often do you drink Passito?	Integrer number from 1 to 5
FREQ_P_HOL	How often do you drink Passito on holidays and celebrations?	Integrer number from 1 to 5
FREQ_P_ALO	How often do you drink Passito when you are alone?	Integrer number from 1 to 5
FREQ_P_MEA	How often do you drink Passito at the end of meals?	Integrer number from 1 to 5
FREQ_P_OFF	How often do you drink Passito offered by someone?	Integrer number from 1 to 5
HOW_MUCH	How much wine do you drink in one year?	Integrer number from 1 to 4
LIKE_PAS	How much do you like drinking Passito?	Integrer number from 1 to 7
LIKE_AROMA	How much do you like aroma and smell of Passito?	Integrer number from 1 to 7
LIKE_SWEET	How much do you like the sweetness of Passito?	Integrer number from 1 to 7
LIKE_ALCOHOL	How much do you like the alcohol content of Passito?	Integrer number from 1 to 7
LIKE_TASTE	How much do you like the intensity of taste of Passito?	Integrer number from 1 to 7
PRICE	How much could you pay for one bottle of Passito? (0.5 litre)	Integrer number from 1 to 5

Heating Habits

Official data by Food and Agricultural Organization (FAO) about per capita food consumption by type of food.

The set of 126 countries with a population greater than 3 milions of people have been considered.

Dataset variables:

- Alcoholic Beverages
- Cereals
- Fruits
- Starchy Roots
- Sugar
- Veg Oils
- Animal Fats
- Meat
- Eggs
- Fish
- Veg_pulses
- Milk
- Population

Hotel

A customer satisfaction survey where four hotels have been evaluated by 40 customers (10 for each hotel) with respect to k=3 variables: cleanliness, courtesy and price.

The data consist of rates from 0 (minimum satisfaction) to 100 (maximum satisfaction).

Dataset variables:

Name	***Type***
Hotel	Categorical
Cleanliness	Numeric
Courtesy	Numeric
Price	Numeric

Students

Let us consider an example of teaching evaluation of k=3 university programs (undergraduate degree in Economics) evaluated by n=20 students with a rate from 0 to 100.

Dataset variables:

Statistics
Mathematics
Econometrics

Mall

A customer satisfaction survey about a a recently opened shopping center.

A sample of n=29 customers was asked to evaluate k=5 different aspects of the shopping center, such as the environmental temperature, the brightness, the presence of sales assistents, the range of products, the background music volume.

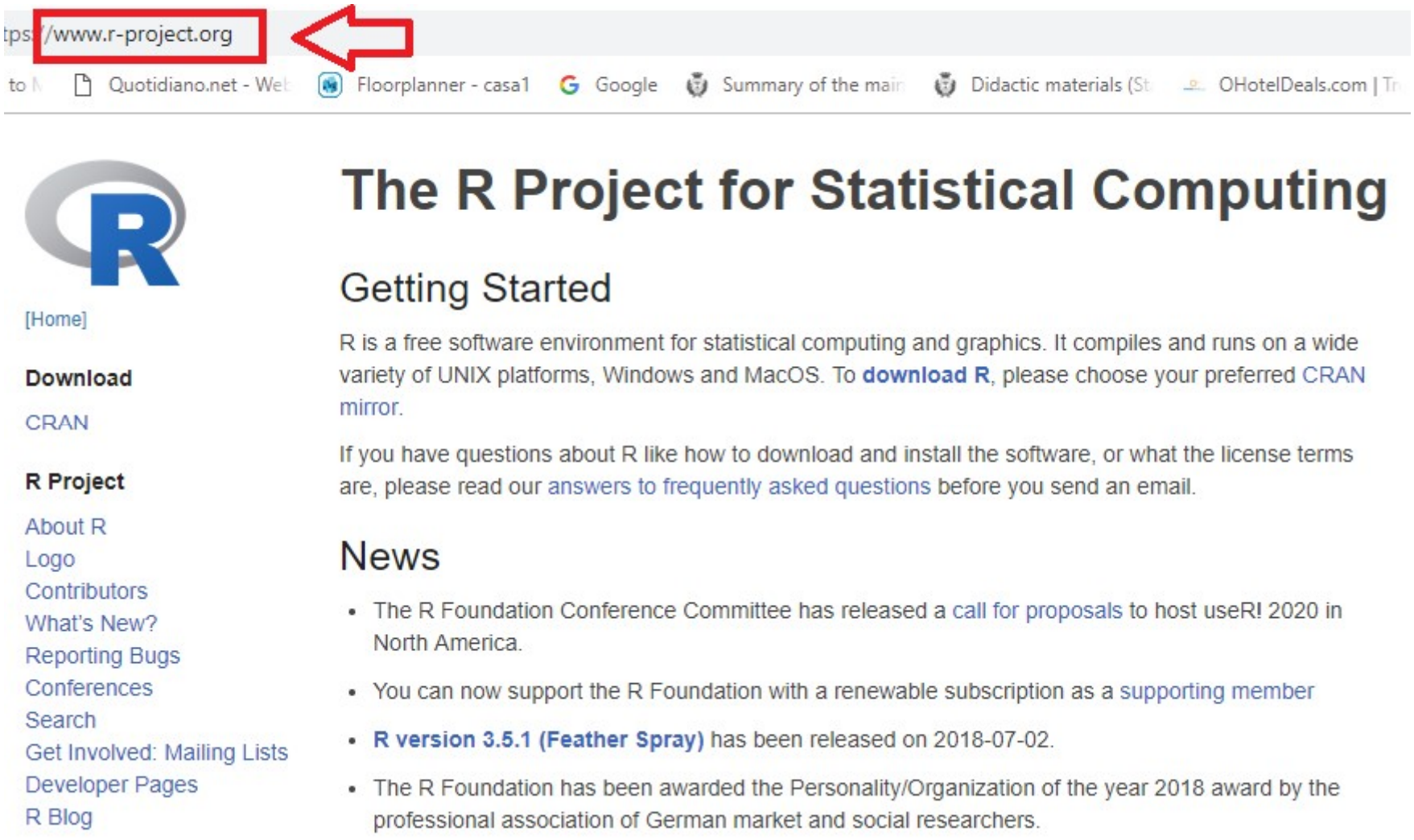
Evaluations are expressed on a scale from -100 («too little») to +100 («too much»), where 0 corresponds to «just right».

Dataset variables:

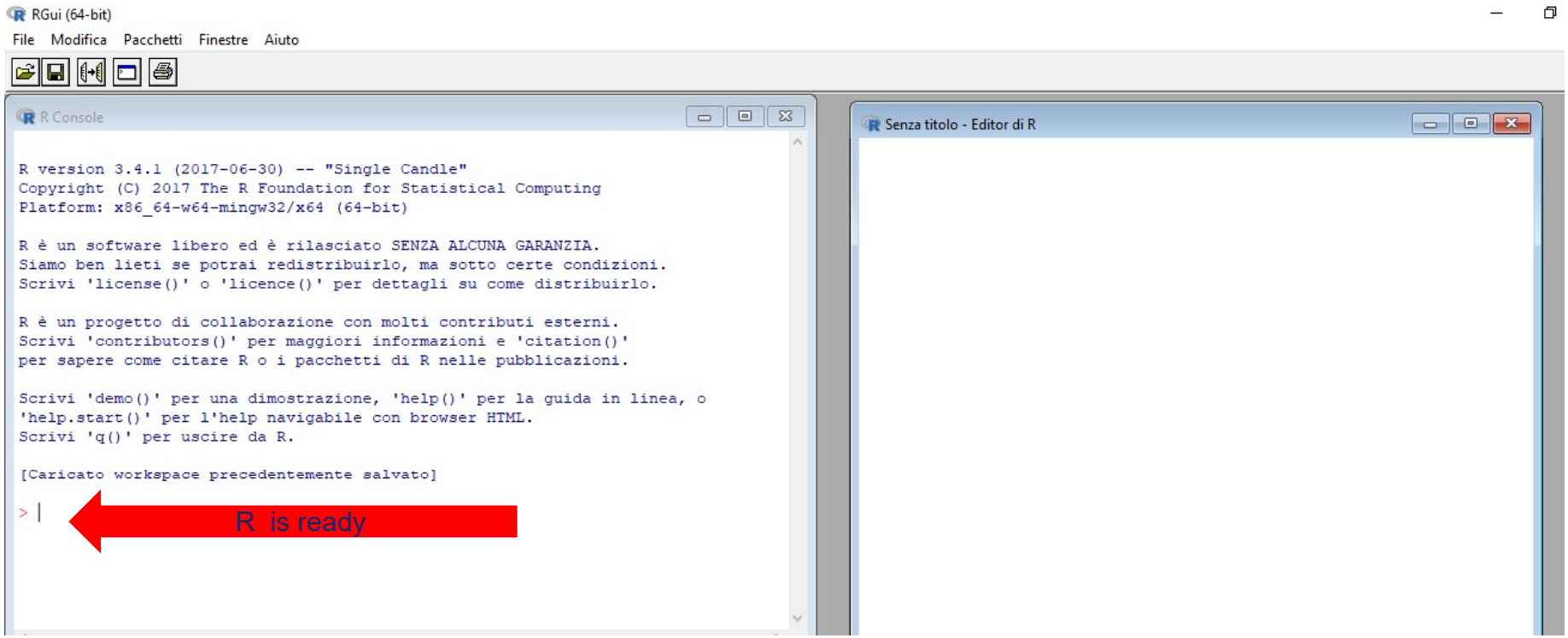
Temp_Level
Brightness
Salesman
Product_assortmant
Music_volume

INTRODUCTION TO THE SOFTWARE R

The main website



Opening R your PC appears like this:



Console: commands and results

Editor (write and save your commands)

The output of your R code is shown in the console in the left corner

Opening R your PC appears like this:

R makes use of the # sign to add comments, so that you and others can understand what the R code is about.

Just like Twitter! Comments are not run as R code, so they will not influence your result.

For example:

Calculate 3 + 4 → is a comment.

OPEN R FROM YOUR PC:

1) Using the console write the following comment: INTRODUCTION TO THE SOFTWARE
2) Calculate 3+6 and insert a comment explaining the computation
3) Calculate 3*3 and insert a comment explaining the computation
4) Calculate 3/3 and insert a comment explaining the computation
5) Calculate 6-3 and insert a comment explaining the computation
6) Calculate (3+3)*2 and insert a comment explaining the computation
7) Calculate 3^2 and insert a comment explaining the computation

Opening R

R communicate with you:

>Means that R is ready for commands
[1] mens that the following output is your results
Error: means you make a mistake!

EXERCISE:
Open R and tape the following commands

```
#introduction to the software
# R can work as a simple calculator
3+6

# we compute the addition 3+6 and we obtain the result = 9
```

Practice yourselves:

Using the console write the following title (as a **comment)**:
INTRODUCTION TO THE SOFTWARE

Perform the following commands,
trying to understand the results and commenting them

1) Calculate 3+6 and insert a comment explaining the computation
2) Calculate 3*3 and insert a comment explaining the computation
3) Calculate 3/3 and insert a comment explaining the computation
4) Calculate 6-3 and insert a comment explaining the computation
5) Calculate (3+3)*2 and insert a comment explaining the computation
6) Calculate 3^2 and insert a comment explaining the computation

First workout using R (basic rules 1/2)

SOME BASIC RULES:

-R is key sensitive (be careful !!! Capital and small letters are different!)

- R communicate to you his status:
  The symbol > means “ready to start”
  The symbol [1] means “result”
  Error means you must have make a mistake
  # indicates a following comment
  If you don’t close your command, R will waits for it

  (ex. Write 3+4- and tape return key … please observe the result)

-How to save your work:
  - The command you want to save must be taped in the **EDITOR window**.
  - The **Editor should be saved using the** extension **.txt**

Data can be picked from an Excel dataset: in this case we must previously save it using the extension **.csv**

First workout using R : basic rules (1/2)

2 operations separated from semicolon ";"

Ex: 3+5*(3.5/15)+5-(2/6*4); 3+2

Operation using square root values:

10+(7-2)*4-8/2+sqrt(9)

Create a variable

x

Assign a value to a variable (you may use = or direct arrow →)

x=6 # R registers the assignment

x and tape return key # R visualizes the content of the object x

Create a series of values (or vector):

v= c(9,5,4)

v