Winter Term 2022/23

Introduction to Quantitative Methods – Lab

Instructor: Barbara Ellynes Zucchi Nobre Silva

Session 1: Friday 14:00 – 15:30
Room: **Seminargebäude, Seminarraum S21**

Session 2: Friday 16:00 – 17:30
Room: **Seminargebäude, Seminarraum S24**

First Session: 25 November 2022

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Office hours by appointment
Zoom: https://uni-koeln.zoom.us/j/7049162834
Meeting-ID: 704 916 2834

Note on ILIAS: There are separate platforms for the lecture and the lab on ILIAS.
• Lecture: Platform for all other material, including the assignments.
• Lab: We only use this for all material strictly related to the lab sessions, meaning the datasets, R scripts and all related files used during the labs.

Registration

Registration for exam in KLIPS2 (for Master students). PhD researchers should send an email to cccp-sekretariat@wiso.uni-koeln.de instead.
Please also regularly check the CCCP information on teaching on the internet:
http://www.cccp.uni-koeln.de/en/public/teaching/

Course description

In this lab, you will practice the application of the fundamentals learned during the lecture Introduction to Quantitative Methods - from Dr. Leonce Röth. The general goal is to apply the knowledges obtained in the lectures through the use of the program R.

The contents to be practiced during the exercises in the lab will always be directly related to the discussions conducted previously during the lectures. Attendance to the lectures is essential to be able to follow the activities developed during the lab sessions.

In order to be able to properly participate on this lab it is fundamental to bring your personal computers to every session. If you do not have a computer available, please contact me or Dr. Leonce Röth with sufficient time so we can discuss feasible alternatives.

Note: both lab sessions will happen in person on Fridays, but in different time slots and different rooms.

Schedule

Week 1 (25.11.2022)   Week 5 (13.01.2023)

Week 2 (02.12.2022)   Week 6 (20.01.2023)

Week 3 (09.12.2022)   Week 7 (27.01.2023)

Week 4 (17.12.2022)   Week 8 (03.02.2023)

Preparations for the lab sessions

Downloading the programs

In order to prepare for the lab sessions, all students must download R and RStudio to the computer they will use to complete the assignments for this lab and for grading. This applies if you still do not have R and RStudio installed and/or if the version you have downloaded is prior to: R 4.2.1 and RStudio 2022.07.1-554

First step: download R 4.2.1

To download R on Windows computers, access: https://cran.r-project.org/bin/windows/base/

To download R on Mac computers, access: https://cran.r-project.org/bin/macosx/
Please, be aware that there are different versions of the R 4.2.1 depending on how new your computer is (if it has an Intel processor or if it has an M1/M2 processor).

Second step: download RStudio

- To download RStudio, access: https://www.rstudio.com/products/rstudio/download/
On Windows computers you should select the RStudio Desktop option and, for Mac computers, lower on the page there is the option to download RStudio for Mac. Both options are available for free.

Once you have downloaded those versions of R and RStudio you should not update or change them during the course of the lab and while writing the assignments unless we instruct you to do so.

Starting to use R

Once you have downloaded both programs, a few steps should be followed in order to facilitate the beginning of the lab sessions.

One important thing to notice from the start is: even though you have downloaded R and RStudio and both programs work together, all the coding to be done in this lab and for the assignments will be written and run in RStudio.

While working with RStudio it is important to know that the program works based on the presence of so called packages, which contain the code that will be used when you develop your statistical analysis. Several of those packages are already included in the memory of the program and do not require any extra effort in order to be used.

However, some packages need to be installed individually before their code can be used and, after installation, they need to be called from the program's library in order to be available. You will need to install some of those packages prior to our sessions in order to try and make sure that the scripts

for each lab can be run without great issues. The process is very simple and is done directly inside RStudio.

Installing and calling packages

1. Open RStudio and, on the top menu bar, click on the plus sign and select R script;

2. The command to install packages is very intuitive: install.packages(), and should be written on the new script you opened;

3. The name of the package needs to be written inside the parentheses **with** quotation marks: install.packages("name of package");

4. Once you have written a command, you need to run it. There are a few options to do so:
   a. The general alternative, that should work on all computers, is to press on the top of the script;
   b. Windows computers: the keyboard shortcut to run the lines of code in which you have your cursor is: Ctrl+Enter;
   c. Mac computers: the keyboard shortcut to run the lines of code in which you have your cursor is: Cmd+Return;

5. Before the first session, please install the following packages:
   a. install.packages("tidyverse")
   b. install.packages("ggplot2")
   c. install.packages("knitr")
   d. install.packages("rio")

6. Each package has to be installed separately. Run one installation at a time so it will be easier for you to check if any error message will appear;

7. The command to call the package from the library is also very intuitive: library();

8. The name of the package being called from the library needs to be written inside the parentheses **without** quotation marks: library(name of package);

9. Try calling one package at a time from the library to check if any error messages will appear. Use the following code to do so:
   a. library(tidyverse)
   b. library(ggplot2)
   c. library(knitr)
   d. library(rio)

Obs1.: In RStudio it is important to notice that the use of symbols - (); []; ""; commas; +; < >; %; $; = ; etc. - are all important parts of the code you are writing and you need to pay attention to where, which and how they are used in order to make sure your code runs smoothly.

Obs2.: between sessions you might be asked to install other packages beforehand. That is all an effort to prevent problems that might hinder the evolution of the labs.
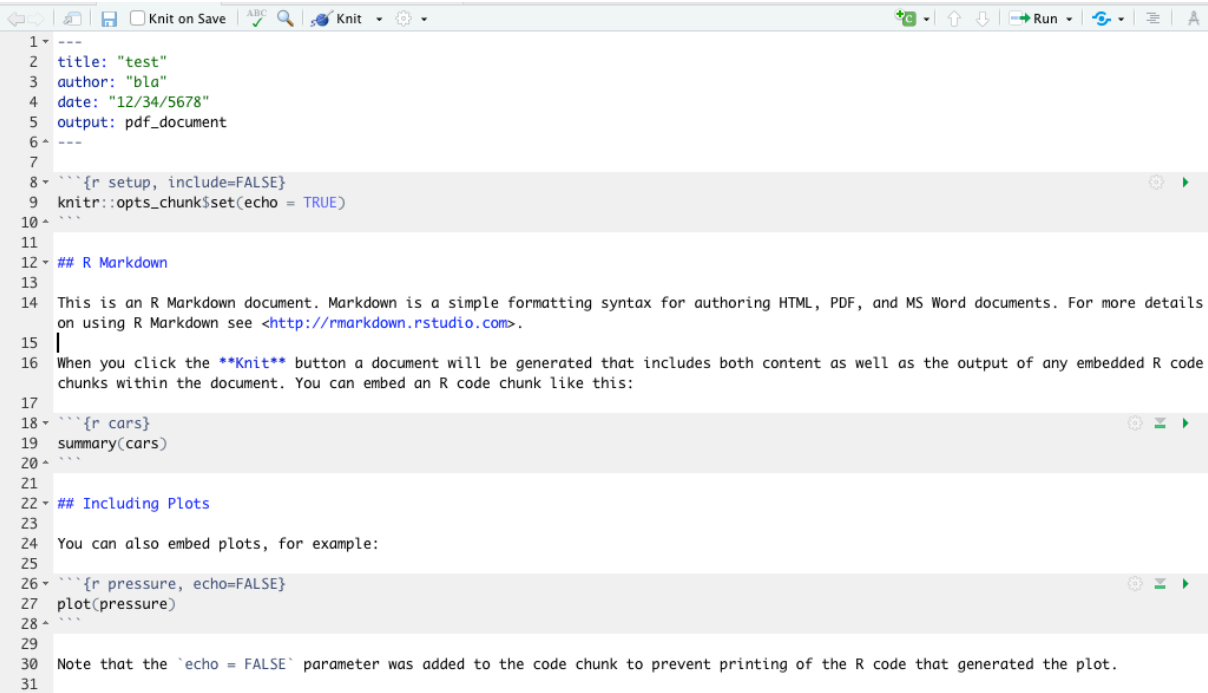
Once the packages are installed, both the ones mentioned above and any other you may be requested to install in future sessions, do not update them during the course of the lab and while writing the assignments unless we instruct you to do so.

Creating an RMarkdown and a PDF with code and results

Once you have written your code and have results to be delivered for the assignments, you will need to create an RMarkdown file and, from it, generate a pdf that will be submitted for grading.

Before the labs you should try to run this process at least one time in order to check whether there will be any problems doing so.

1. On the same plus button from before [icon] click on the option R Markdown…

2. When you click this option, RStudio might request the installation or update of existing packages that are necessary for RMarkdown to work. If that is the case, allow the program to install and/or update the necessary packages;

3. After this is done, you should see a window in which you will need to give a title to the work you will present in the file (for example, "test" or "Assignment 1"), your name as the author, and select the type of document you wish to generate at the end (in our case, it will be a pdf file);

4. After this step is completed, a new tab will open on your RStudio that now has a red symbol on the top and looks somewhat like this:

5. Once you have reached this screen, click on the button on the top of this tab called "Knit";

6. After you click this button you will be asked to save the file on your computer and, automatically, a pdf will be generated with your coding and its outcomes. This pdf will be saved on the same folder in which you saved the RMarkdown file;

7. In the lab sessions I will explain in more detail how you should display your coding within this RMarkdown file and some of the possibilities you have of altering how things are displayed. The important part right now is to make sure that you can perform all of this steps without having any error messages.

Be always aware of possible error messages that might appear and try to read and understand them. A lot of times it is possible to recognize what is going wrong and/or is missing by reading the errors.

If you have any problems with installing packages, calling them from the library, creating an RMarkdown file and/or generating a pdf, please contact me before the first session. We might not have time to go over errors during the sessions and, this way, we can try to have all of this running smoothly from the beginning.