Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
RI203	Statistical Methods in Social Sciences	3	2	0	0	2	3

Prerequisites	
Admission Requirements	

Language of Instruction	French
Course Type	Compulsory
Course Level	Bachelor Degree
Objective	This course aims to help students conducting research in the social sciences and international relations acquire the statistical mindset necessary to manage the uncertainty they encounter. The course requires no prior programming knowledge and begins by building skills in data manipulation, cleaning, transformation, and visualization with modern graphical techniques in R; the logic of reproducible analysis via R Markdown/Quarto is introduced early on. In subsequent weeks, simple and multiple linear regression models are constructed and interpreted in line with research questions, and group differences and conditional relationships are analyzed through dummy variables and interaction terms. At the end of the semester, the basic logic of causal inference and the difference-in-differences approach are introduced; the panel data structure and how unobserved unit heterogeneity is addressed through fixed effects, first differences, and random effects are demonstrated. Throughout the course, students are expected to critically interpret statistical inference tools such as standard errors, confidence intervals, p-values, and effect sizes, and to transform their results into valid insights and empirical evidence. In this course, students are not expected to memorize formulas; rather, they are expected to select data appropriate to the research question, analyze it in the R environment, critically interpret the results, carry out a joint analysis process within a group, and report this process in a reproducible manner. Students may use AI tools in coding, debugging, and interpretation, but they are obliged to explain and defend every analysis step they use.
Content	The course begins with setting up a reproducible data analysis process in the R/RStudio and Quarto/R Markdown environment. It then covers data management, descriptive analysis, and visualization with ggplot2. Simple and multiple linear regression and statistical inference are then introduced. At the end of the semester, the difference-in-differences approach and panel data analysis are introduced.
References	1. Wickham, H., Çetinkaya-Rundel, M., & Grolemund, G. (2023). R for Data Science (2nd ed.). Open-access foundational resource for data management, cleaning, transformation, and visualization with R. https://r4ds.hadley.nz/ (English) and https://tr.r4ds.hadley.nz/ (Turkish) 2. Wooldridge, J. M. (2020). Introductory Econometrics: A Modern Approach (7th ed.). Cengage Learning. For this course, reading the first 4 chapters and chapters 6, 7, 13, and 14 is sufficient. For the datasets and R code used in the book, see https://justinmshea.github.io/wooldridge/ 3. Some open datasets and R packages to be used throughout the course: • V-Dem Institute: https://www.v-dem.net/data/, R package: vdemdata • World Bank Open Data: https://data.worldbank.org/, R packages: WDI, worldbank. • UCDP/PRIO Armed Conflict Dataset: https://www.prio.org/data/4 • Gapminder: R package: gapminder • World Values Survey: https://www.worldvaluessurvey.org/ • European Social Survey: https://www.europeansocialsurvey.org/, R package: essurvey • For other data easily downloadable and

Theory Topics

Week	Weekly Contents
1	Introduction to R/RStudio; dynamic documents with R Markdown/Quarto
2	Data transformation/cleaning with dplyr and tidyr
3	Exploratory data analysis – numerical summaries
4	Exploratory data analysis – visual exploration with ggplot2

Week	Weekly Contents
5	Midterm exam
6	Simple linear regression: causality, regression model, coefficient interpretation.
7	Multiple linear regression
8	Statistical inference: standard errors, confidence intervals, t-statistic values, p-values.
9	Dummy variables and categorical explanatory variables
10	Interaction terms (product variables)
11	Basic difference-in-differences approach
12	Panel data analysis
13	POSTER PRESENTATIONS I
14	POSTER PRESENTATIONS II