Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
ECK 561	Econometrics	1	3	0	0	3	8

Prerequisites	
Admission Requirements	

Language of Instruction	Turkish
Course Type	Compulsory
Course Level	Masters Degree
Objective	The aim of the course is to equip MA students in economics with the fundamental tools of econometric analysis and to develop their ability to apply and interpret these tools with real economic data in R. In this context, the following topics will be covered and the following skills will be developed: • Organizing, cleaning, transforming, and visualizing data with the R software using modern graphical techniques. • Learning the logic of reproducible analysis early on through R Markdown/Quarto. • Constructing and interpreting simple and multiple linear regression models in line with research questions. • Critically interpreting statistical inference tools such as standard errors, confidence intervals, t-statistics, and p-values. • Validating inference through resampling-based alternative approaches via bootstrap and permutation tests. • Analyzing group differences and conditional relationships using dummy variables and interaction terms. • Introduction to advanced topics in regression analysis: model selection, functional form, variable scaling, and structural change tests. 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 an individual analysis process, 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. In the second week, data flow in R (input-output) is covered. It then covers data management, descriptive analysis, and visualization with ggplot2. Simple and multiple linear regression, statistical inference, and bootstrap methods are then taught. At the end of the semester, dummy variables, interaction terms, and advanced topics in regression analysis — adjusted R2 and model selection, functional form (level–log comparison, RESET test), variable scaling, beta coefficients, and structural change (Chow test) — are covered.
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 the datasets and R code used in the book, see https://justinmshea.github.io/wooldridge/ 3. Some datasets and R packages you may find useful: • Eurostat: European Union statistics: https://ec.europa.eu/eurostat/web/main/data/database, R packages: eurostat, restatapi. • OECD Data Explorer: Economic and social indicators: https://www.oecd.org/en/data.html, R packages: readoecd, OECD. • Penn World Table (PWT): https://www.rug.nl/ggdc/productivity/pwt/, R package: pwt10. • World Bank Open Data: Development indicators: https://data.worldbank.org/, R package: WDI. • World Values Survey: https://www.worldvaluessurvey.org/ • European Social Survey: https://www.europeansocialsurvey.org/, R package: essurvey • For other data easily downloadable and explorable via R packages, see https://github.com/rOpenGov

Theory Topics

Week	Weekly Contents
1	Introduction to R/RStudio; dynamic documents with R Markdown/Quarto
2	Data input-output: reading data in various formats into R and exporting from R
3	Data management with R: data transformation/cleaning with dplyr and tidyr
4	Exploratory data analysis – numerical summaries
5	Exploratory data analysis – visual exploration
6	Midterm exam
7	Simple linear regression: causality, regression model, coefficient interpretation
8	Multiple linear regression
9	Statistical inference: standard errors, confidence intervals, t-statistic values, p-values
10	Bootstrap and permutation tests
11	Dummy variables and categorical explanatory variables
12	Interaction terms (product variables)
13	Advanced topics in regression analysis
14	POSTER PRESENTATIONS