

APPLIED STATISTICS FOR SOCIAL AND POLITICAL SCIENCES

Year 2023/2024

Spring term, Year 1

Instructors: Daniel Auer, Elena Pisanelli, Aron Szekely

Hours: 40 (20 hrs of lectures, 20 hrs of STATA lab)

Requirements

No formal requirements in the Allievi Program.

Recommended preliminary readings:

- Agresti, A. (2018). *Statistical Methods for the Social Sciences*, (fifth edition) Boston: Pearson. Chapters 1-3 (covering the basics of descriptive statistics (types of variables, measures of central tendency, measures of dispersion, cross-tabulation, scatter plots, bivariate descriptive statistics e.g. correlation coefficient)).
- Kellstedt, Paul M., and Guy D. Whitten (2018). *The fundamentals of political science research* (third edition). Cambridge: Cambridge University Press. Chapter 6

Course Aim

The aim of this course is to provide you with the core statistical and conceptual tools needed to understand and conduct reliable empirical research in the social and political sciences.

At the end of the course, you should be able to:

- 1) display and explore data, compute and graph linear relations, understand basic probability distributions and statistical inferences, and simulate random processes to forecast uncertainty
- 2) build, fit, understand, use, and assess the fit of linear regression models and have a basic understanding of logistic regression models.
- 3) understand the assumptions underlying causal inference and perform causal inference in simple experimental settings using regression to estimate treatment effects

Reference textbooks

Gelman, Andrew, Jennifer Hill, Aki Vehtari (2020). *Regression and Other Stories*. Cambridge: Cambridge University Press.

Kellstedt, Paul M., and Guy D. Whitten (2018). *The fundamentals of political science research* (third edition). Cambridge: Cambridge University Press.

Additional reading material can be assigned in some weeks.

Evaluation

After the end of the course, students will be assigned a research question and a dataset to work with. They are expected to develop a (statistical) strategy to address the research question, apply it to the data, and report the results in a short essay.

Outline

Each week consists of a 2-hour lecture, where topics will be presented from a theoretical and intuitive way, and a 2-hour hands-on tutorial, which will guide you to the application of each topic with the statistical software STATA.

You are expected to read the assigned material before each class.

Week 1: Review of descriptive statistics

Week 2: Understanding probability, understanding your data

Week 3: Statistical inference

Week 4: Statistical analysis in practice

Week 5: Bivariate hypothesis testing

Week 6: Linear regression with one predictor

Week 7: Linear regression with multiple predictors

Week 8: Behind regression: assumptions, diagnostics, and evaluation

Week 9: Introduction to logistic regression

Week 10: Statistical and causal inference