MA151 Introduction to Statistics

Seminar Leader: Thomas Eife
Email: t.eife@berlin.bard.edu
Course times: Tuesdays and Thursdays, 9.00-10.30
Office Hours: by appointment

Course Description

This course provides a comprehensive introduction to quantitative methods in economics and political science, with a focus on building a solid foundation in statistical reasoning and analysis. Students will explore both the theoretical and practical aspects of descriptive and inferential statistics, including key topics such as data visualization, measures of central tendency and variability, probability theory, sampling, hypothesis testing, and regression analysis.

By the end of the course, students will have the tools to understand, apply, and critically evaluate statistical methods used in social science research. Through a combination of lectures, real-world examples, and hands-on exercises, students will gain practical experience in data analysis and interpretation, fostering their ability to approach complex questions with a data-driven mindset.

The course also emphasizes the role of statistics in addressing real-world challenges, such as analyzing economic trends, understanding public opinion, and evaluating policy outcomes. Weekly exercises and applied projects will allow students to reinforce their learning and develop confidence in working with statistical software to solve practical problems.

Requirements

Active participation is a central requirement of this course. Students are expected to engage thoughtfully in class discussions, ask questions, and contribute to group activities. Regular attendance is essential to ensure a solid understanding of the material.

To reinforce learning, weekly problem sets will be assigned. These problem sets are designed to help students practice the concepts covered in class and build their statistical skills incrementally. In addition to the weekly assignments, students will complete a number of larger take-home quizzes throughout the semester. These quizzes will focus on applying statistical methods to real-world scenarios, encouraging critical thinking and the practical use of the tools learned in class.

Timely submission of all assignments and quizzes is expected.

Textbook
We will use the OpenSource Textbook "OpenIntro Statistics" by Diez/Cetinkaya-Rundel/Barr, 4th edition, 2019, (which can be freely downloaded via www.openintro.org/book/os.

Computer and software requirements

The students will be required to bring their laptops to some of the classes. During the course we will use the statistical software Stata. You are required to have your own copy of Stata. The faculty will try to organize complimentary copies of Stata.

Academic Integrity

Bard College Berlin maintains the highest standards of academic integrity and expects students to adhere to these standards at all times. Instances in which students fail to meet the expected standards of academic integrity will be dealt with under the Code of Student Conduct, Section 14.3 (Academic Misconduct) in the Student Handbook.

Accommodations

Bard College Berlin is committed to inclusion and providing equal access to all students; we uphold and maintain all aspects of Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act of 1990, and the ADA Amendments Act of 2008, and Section 3 of the German Disability Equality Act of April 27, 2002 (Federal Law Gazette I p. 1468). If you have a disability, or think you may have a disability, please contact the Disability Accommodation Coordinator, Atticus Kleen, (accommodations@berlin.bard.edu) to request an official accommodation.

Attendance

Attendance at all classes is a crucial part of the education offered by Bard College Berlin. To account for minor circumstances, two absences from twice-per-week courses or the equivalent (e.g. one absence from a once-per-week course) should not affect the participation grade or require documentation.

Bard College Berlin may not offer credit for any course in which a student has missed more than 30% of classes, regardless of the reasons for the absences. The full Bard College Berlin attendance policy can be found in the Student Handbook, Section 2.8.

Assessment

Assessment will be based on attendance, preparation for classes, regular and active participation, professionalism, quizzes, exercises as well as a midterm and final examination.

Grade Breakdown

- 25 percent midterm
- 25 percent final
- 30 percent participation and problem sets
- 20 percent take-home quizzes and presentations

Schedule

The Spring semester runs from Monday, January 27 and runs until Friday, May 16, with the fall break planned from Monday, April 14, - Sunday, April 20, 2025.

- Normal course sessions end on Friday, May 9.
- Completion week is from Monday, May 12 through Friday, May 16.
  - Make-up classes and final exams can take place in completion week.
  - Students are required to be on campus during completion week.

Classes missed due to federal holidays will not be rescheduled. Classes missed due to conferences or due to illness (of the professor) are rescheduled.

Week 1-2: Introducing data and measurement
- Motivation, the big picture
- Observations and variables, levels of measurement, sampling
- Conceptual and operational definitions, measurement error

Week 2-3: Describing data
- Visualizations: Scatterplots, histograms, boxplots
- Measures of central tendency and dispersion

Week 4-5: Probability
- Rules of probability, joint and conditional
- Distributions, densities, random variables

Week 6: Normal distribution and z-scores
- Central limit theorem, calculating z-scores

Week 7: Review and midterm exam

Week 8: Introducing statistical inference and confidence intervals
- t-distribution, standard errors, confidence intervals, sampling proportions
- Hypothesis testing, type I and type II errors

Week 9-10: Statistical inference for categorical data
- Cross-tabs, partial effects
- Chi-square tests

Week 11-12: Statistical inference for numerical data
- Differences in means, t-tests (comparing two groups)
- ANOVA (comparing many groups)

Week 13: (Optional) Introducing linear regressions
- OLS estimation, interpretation of coefficients, R-squared
- Model specification, comparing models

Week 14: Review

Classes missed due to federal holidays will not be rescheduled.

(this version: November 29, 2024)