Bard College Berlin
A LIBERAL ARTS UNIVERSITY

MA151 Introduction to Statistics

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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.

Requests for accommodations should be made as early as possible to ensure adequate time for coordination and planning. Please note that accommodations are not retroactive and may require advance notice to implement.

If you have already been approved for accommodations with the Disability Accommodation Coordinator, please arrange to meet with me outside of class so that we can develop an implementation plan.

Students may face extenuating circumstances related to various personal or external factors, which impact their academic performance. While these circumstances often do not fall within the legal framework of Disability Accommodations, Bard College Berlin is committed to supporting students experiencing such circumstances. A student needing a short extension or a replacement assignment because of an extenuating circumstance is encouraged to make arrangements directly with instructors if possible. If further support is needed, please visit the Bard College Berlin Accessibility page. Questions about this process can be directed to James Harker (j.harker@berlin.bard.edu) or Maria Anderson-Long (m.andersonlong@berlin.bard.edu).

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

- 30 percent midterm
- 30 percent final
- 10 percent participation and problem sets
- 30 percent take-home

Schedule

The Fall semester runs from Monday, September 1 and runs until Friday, December 19, with the Fall break planned from Monday, October 20, - Sunday, October 26, 2025.

- Normal course sessions end on Friday, December 12.
- Completion week is from Monday, December 15 through Friday, December 19.
    - Make-up classes and final exams can take place in completion week.
    - Students are required to be on campus during completion week.

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: June 4, 2025)