Hertie School

Fall Semester 2025

Course Syllabus

GRAD-C5: Statistics I: Inference and Regression

1. General information

Course Format	Onsite, Forum A&B (lectures) and seminar rooms (labs)
Instructor(s)	Maria Uttenthal
Instructor's E-mail	m.uttenthal@hertie-school.org
Assistant	Dayna Sadow, room 2.42.1 (sadow@hertie-school.org)
Instructor's Office Hours	Wednesday afternoons, please make an appointment using my booking link: Book time with Maria Vang Uttenthal: Office hours Stats I

Lab instructor	Day	Time	Room
Schumann, Maurice (Head TA)	Wednesday	10:00 – 12:00	2.34
Schumann, Maurice	Wednesday	12:00 – 14:00	2.34
Diaz, Carolina	Wednesday	08:00 – 10:00	2.32
Diaz, Carolina	Wednesday	10:00 – 12:00	2.32
Diaz, Carolina	Friday	14:00 – 16:00	3.30
Diaz, Carolina	Friday	16:00 – 18:00	2.32
Chavez, Sarahi	Wednesday	18:00 – 20:00	3.30
Chavez, Sarahi	Thursday	08:00 – 10:00	3.30
Truelsen, Emilie	Friday	08:00 – 10:00	2.61
Truelsen, Emilie	Friday	16:00 – 18:00	2.30
Truelsen, Emilie	Friday	18:00 – 20:00	2.30
Krümmel, Johann	Thursday	16:00 – 18:00	1.61
Krümmel, Johann	Thursday	18:00 – 20:00	1.61
Zwar, Claudia	Thursday	12:00 – 14:00	3.30
Zwar, Claudia	Thursday	18:00 – 20:00	2.32
Garcia Durrer, Sofia	Wednesday	12:00 – 14:00	Forum A/B
Garcia Durrer, Sofia	Wednesday	18:00 – 20:00	2.61

Link to Study, Examination and Admission Rules and MIA, MDS and MPP Module Handbooks

For information on **course room, times and session dates,** please consult the Course Schedule on *MyStudies*.

Instructor Information:
Maria Uttenthal is a Lecturer and Academic Counsellor at the Hertie School. She holds a PhD from the Hertie School, and her research focuses on building closer connections between quantitative methods and systematic conceptual work in the social sciences. She brings extensive teaching experience within Statistics and Research Design, including as a Lecturer of Statistics at Bard College Berlin. At the Hertie School, Maria also teaches and counsels students on research skills for their master's theses. She further holds an MSc in European Public Policy and a BSc in Economics from University College London.

2. Course Contents and Learning Objectives

Course contents:
This course offers an introduction to quantitative research methods for public policy. By the end of the semester, students should have a better acquaintance with quantitative methods conducive to empirical policy research and the ability to understand and critique the techniques employed by others. No prior knowledge of statistics is assumed, and we will make every effort to address concepts both quantitatively and theoretically. Additionally, every student will attend a weekly lab session run by a teaching assistant in which concepts will be reinforced, where possible, through hands-on application using R. The goal of this course is not only to produce sophisticated consumers of quantitative research but to provide the necessary skills for students to conduct their own research. As such, we eschew the conventional stopping point for an introductory statistics course and spend several weeks on multiple regression. Attendance in both lecture and lab is mandatory. I urge students to keep up with the readings since the information in this class is highly cumulative.

Learning objectives:
- Obtain foundational knowledge of statistics for public policy.
- Understand and engage with methods of statistical inference, including regression analysis.
- Assess and develop statistical models used within empirical policy research.
- Conduct your own empirical analyses using the statistical software R.

Teaching style:
This is a lecture course that focuses on instilling an intuitive understanding of fundamental concepts of statistics through the use of examples, visual representations and elementary mathematics.

Prerequisites:
This is an introductory statistics course that should make statistics accessible to all student willing to invest the necessary effort. No prior knowledge of statistics, experience with R or mathematics above the high school level is necessary.

Diversity Statement:
In this classroom and at the Hertie School more broadly, we respect and value differences in neurodivergence, race, gender, ethnicity, age, physical and language abilities, culture, religion, sexual orientation, and other identities. Such differences contribute to the strength of our community, and upholding an atmosphere of inclusion and mutual respect is of the utmost importance.

This class will also contain a diversity of backgrounds and experiences with mathematics, coding, and statistics. It is everyone's responsibility to promote and maintain an environment where all students feel comfortable asking questions and voicing their struggle. Mutually supporting one another will be at the heart of everyone's success in this class, and we hope that more advanced students will help their peers.

Students are encouraged to bring up any concerns relating to these policies, or any other hardships that they encounter, with us as early as possible, and we will make every effort to resolve them.

3. Grading and Assignments

Composition of Final Grade:

Homework Assignments	Due: Weekly	Submit via Moodle	20%
Midterm exam	Due: TBA, Oct 27 or Oct 28	Onsite	20%
Final exam	Due: TBA, week of 15 December	Onsite	25%
Final data analysis (FDA)	Due: 5pm on the Tuesday following finals week (23.12.25).	Submit via Moodle	25%
Lab participation			10%

Assignment Details

Homework assignments
Weekly problem sets are distributed on Moodle. Usually, questions are graded automatically so that the feedback is fast.

Midterm and final exam
The two exams cover concepts and applications in statistics and research design, but do not cover the use or mastery of R.

Final data analysis
To provide students with an incentive and opportunity to develop their R skills, I will distribute a data set and questions toward the end of the semester for the students to analyze using R. This assignment, similar to a take-home exam, must be completed individually.

Participation grade
The participation grade assumes that students take part, not as passive consumers of knowledge, but as active participants in the exchange, production, and critique of ideas—their own ideas and the ideas of others. Therefore, students should come to class not only having read and viewed the materials assigned for that day but also prepared to discuss the readings and to contribute thoughtfully to the conversation. Participation is marked by its active nature, its consistency, and its quality.

Late submission of assignments: For each day the final data analysis is turned in late, the grade will be reduced by 10% (e.g. submission two days after the deadline would result in 20% grade deduction). The weekly homework assignments cannot be turned in late because the answers are made public immediately after the submission deadline.

Attendance: Students are expected to be present and prepared for each class session. Active participation during lectures and seminar discussions is essential. Please note that students can miss up to two sessions (out of twelve) if no course assignments are affected. **Students do not need to inform the course instructor(s) in advance if they are unable to attend a session.** For further information please consult the Examination Rules §10.

Academic Integrity: The Hertie School is committed to the standards of good academic and ethical conduct. Any violation of these standards shall be subject to disciplinary action. Plagiarism, misuse of AI, free riding in group work, and other deceitful actions are not tolerated. See Examination Rules §16, the Hertie Plagiarism Policy, and the Hertie Guidelines for Artificial Intelligence Tools.

Compensation for Disadvantages: If a student furnishes evidence that he or she is not able to take an examination as required in whole or in part due to disability or permanent illness, the Examination Committee may upon written request approve learning accommodation(s). In this respect, the submission of adequate certificates may be required. See Examination Rules §14.

Extenuating circumstances: An extension can be granted due to extenuating circumstances (i.e., for reasons like illness, personal loss or hardship, or caring duties). In such cases, please contact the course instructor and Examination Office *in advance* of the assignment deadline.

4. Course Sessions and Readings

Required readings (see course sessions for specific chapters):

- **Meier:** Kenneth J. Meier, Jeffrey L. Brudney and John Bohte. Applied Statistics for Public and Nonprofit Administration. Thompson Wadsworth. (9th ed). Other editions are also acceptable as the book changes very little between editions.

- **FW:** Fox and S. Weisberg, An R Companion to Applied Regression, Third Edition, Sage, 2019.

- **Bailey:** Bailey, M. A., Real Stats: Using Econometrics for Political Science and Public Policy, Second Edition, Oxford University Press, 2020

Help with R:

- Nick Huntington-Klein (2021). The Effect: An Introduction to Research Design and Causality. https://theeffectbook.net/index.html

- Hadley Wickham and Garrett Grolemund. (2017). R for Data Science. Available at: https://r4ds.had.co.nz/.

All course readings can be accessed on the course Moodle page.

Session 1 / 8. & 9. Sept: Motivation and Overview; Measurement: Theory, Validity, Reliability, Levels of Measurement	
Required Readings	**Meier: Chapter 1, 2**

Session 2 / 15. & 16. Sept: Research Design: Experiments & Quasi-Experiments; forming hypotheses; Internal & External Validity; Regression to the mean; Out-of-sample extrapolation; Causality & Spuriousness	
Required Readings	**Meier: Chapter 3** **Schwab, S. and Held, L. (2020). Different worlds confirmatory versus exploratory research. Significance, 17(2):8–9.**

Session 3 / 22. & 23. Sept: Descriptive Statistics: Levels of Measurement, Measures of Central Tendency; Measures of Dispersion, Skew; Frequency Distributions; Normal Distribution; z-scores	
Required Readings	**Meier: Chapter 4-7**

Session 4 / 29. & 30. Sept: Statistical Inference I: Central Limit Theorem, the t-distribution, Standard Errors, Confidence Intervals, Sample Proportions	
Required Readings	**Meier: Chapter 10, 12**

Session 5 / 6. & 7. Oct: Statistical Inference II: Hypothesis testing, testing the difference between two groups	
Required Readings	**Meier: Chapter 11, 13**

Session 6 / 13. & 14. Oct: Categorical Variable Analysis: Cross-tabs, Chi-sq, PRE, Controlling for a third variable	
Required Readings	**Meier: Chapter 14-16**

Session 7 / 20. & 21. Oct: Linear Regression: Correlation, Bivariate regression, Goodness of Fit	
Required Readings	**Meier: Chapter 17** **FW: Chapter 4.1, 4.2.1**

MIDTERM EXAM (27. OR 28. Oct): Topics from session 1-6

Session 8 / 3. & 4. Nov: Multivariate modelling I: OLS Assumptions, Robust Standard Errors, Multiple Regression, Interpretation	
Required Readings	**Meier: Chapter 18, 20** **FW: Chapter 4.2.2, 8.5**
Optional Readings	Keele, L., Stevenson, R. T., and Elwert, F. (2020). The causal interpretation of estimated associations in regression models. Political Science Research and Methods, 8(1):1–13.

Session 9 / 10. & 11. Nov: Multivariate modelling II: Model Specification, Omitted Variable Bias, Multicollinearity, Post-treatment Bias, Regression Tables	
Required Readings	**Meier: Chapter 20 (again)**
	FW: Chapter 4.8, 8.8
Optional Readings	Wysocki, A. C., Lawson, K. M., and Rhemtulla, M. (2022). Statistical control requires causal justification. Advances in Methods and Practices in Psychological Science, 5(2)
	Ch. 6.2, 6.3 Coppock et al. Research Design in the Social Sciences (https://book.declaredesign.org/)

Session 10 / 17. & 18. Nov: Multivariate modelling III: Dummy Regression, Influential Observations Partial Regression Plots	
Required Readings	**Bailey**: **Chapter 6.1-6.3**
	FW: Chapter 8.2.3, 8.3

Session 11 / 24. & 25. Nov: Multivariate modelling IV: Interactions, Polynomial Regression, Logged variables	
Required Readings	**Bailey: Chapter 6.4, Chapter 7.1-7.2**
	FW: Chapter 4.4, 4.6

Session 12 / 1. & 2. Dec: Review; a peek at Panel Data	
Required Readings	**Bailey: Chapter 8.1-8.3**

FINAL EXAM (week of 15. Dec): Topics from session 7-12

The lecturer reserves the right to adjust the topics and timeline, ensuring the appropriate level and pace of the course.