# Syllabus

Microeconometrics, Leipzig University
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## 1 Course Description

The course aims to teach the statistical tools necessary for empirical microeconomic analyses. We cover both main categories of statistical analyses delineated by John Tukey (We Need Both Exploratory and Confirmatory, 1980) as tools to aid microeconomic analyses. The first part of the course is Microeconomic Statistics: summarizing microeconomic data and empirical relationships using "exploratory data analysis" and "flexible models". This conveys timely techniques and recently developed methods and applies them to some problem sets. After that, we transition to the second part of the course, Statistical Microeconomics: parametric modelling and testing formal theoretical hypotheses. This teaches how to interpret and misinterpret microeconomic data as we begin working on empirical projects. The teaching formats are lectures, readings, computational assignments, presentations, and a final paper. The class also imparts the use of the statistical software R, interactive programming via Shiny, and reproducible reporting via Rmarkdown.

Format: In Person (Planned)
Workload: 4 SWS, 10 ECTS (About 50 hours of seminar lectures and assignment-reviews, as well as about 250 hours of self-study and homework).
Grading: Final exam and final paper.

It is strongly recommended that you take Advanced Econometrics beforehand.

## 2 Assignments

At first, I will provide weekly lectures, homeworks assignments (which we review together), and interactive labs. After about half way through the course, we transition themes and you will begin working on an empirical project. At this point, the interactive labs will be replaced by you (the student) presenting an article related to your research topic. At the end of the semester, you will write a paper on your research project and take a final exam.

**Readings.** We read articles on econometric methodology and spend some time in class discussing the issues raised in them.

**Small Homeworks.** You (and then we) will work through frequent small weekly homework assignments for the first part of the semester. Any such assignments are to be turned in online as an R Markdown report turned in *before* class. This should be a html file with the markdown code downloadable in the top right and titled `COURSE_ASSIGNMENT_LASTNAME_FIRSTNAME.html`.

**Labs.** We work through some computer applications related to the lecture. These labs are computer applications related to the lecture or to your replication-extension project. (Before taking a break between the lecture and the lab, verify all R-packages associated with the lab are installed and working on your PC.)

**Presentation/Poster.** You will summarize and present your progress on your final project. Each presentation is about 30 minutes and presents slides and a poster, both written using R-markdown.

**Final Paper.** You will write an paper by the end of the semester of around $20-30$ pages. More details will come, but your writing should be clear and concise while still making it clear you understand the tools you've been learning.

# 3 Outline

Our schedule will mirror that of a typical research project. We begin with Economic Statistics where we summarize and describe microconomic data under the assumption they will *not* be "well-behaved". Here, we cover topics of nonlinear data analysis, statistical significance, and average and distributional treatment effects. We then procede to Statistical Economics where we theoretically model data generating processes and formally test our hypotheses. Here, we cover topics of extensive and interdependant choice, as well as structural modelling. I specifically plan for the following timeline, but reserve the right to change it any point.

| Week | Lecture | Notes | Labs | Homework |
|---|---|---|---|---|
| 1 | Intro | 1 | R-Programming | Reading |
| **Economic Statistics** | | | | |
| 2 | Kernels | 2-2.4 | R-Markdown | Reading, HW1 |
| 3 | Multivariate LLLS | 2.5-2.7 | Shiny App.: LOESS | Reading, HW2 |
| 4 | Simulation Method | 3-3.6 | Permute/B-strap C.I., H-Test | Reading, HW3 |
| 5 | Moment Asymptotia | 3.7-3.9 | Monte Carlo CLT | Reading, HW4 |
| 6 | Lab/Field Experiment | 4-4.3 | Shiny App.: Beckerian Demand | Reading, HW5 |
| 7 | Natural Experiment | 4.4-4.7 | Discuss Term Papers | Reading, HW6 |
| 8 | Quantile Effects | 5 | Income Inequality | Reading, HW7 |
| **Statistical Economics** | | | | |
| 9 | Discrete Outcomes | 6 | Random Choice Models | Reading, HW8 |
| 10 | Sample Selection | 7 | Random Choice Models II | Reading, HW9 |
| 11 | Structural | 8 | | *Proposal Due* |
| 12 | Reduced Form | 8 | | Lit. Review |
| 13 | Atheoretic | 8 | | Summarize Paper |
| 14 | Incidental Param's | 9-10 | | Prelim. Analysis |
| 15 | | | *Student Presentation and Poster* | |
| 16 | | | *Student Paper Due* | |

*Deadlines in italics.*

**Weekly Reading List.**

1 J. E. Biddle and D. S. Hamermesh (2016). *Theory and Measurement: Emergence, Consolidation and Erosion of a Consensus*. Working Paper 22253. National Bureau of Economic Research. URL: http://www.nber.org/papers/w22253

1 M. T. Panhans and J. D. Singleton (2017). "The Empirical Economist's Toolkit: From Models to Methods". In: *History of Political Economy* 49.Supplement, 127–157. URL: https://doi.org/10.1215/00182702-4166299

2 Video of Guido Imbens Nobel Speech (2021) https://youtu.be/8QWGb-Qu4XY

2 J. D. Angrist and J.-S. Pischke (2010). "The Credibility Revolution in Empirical Economics: How Better Research Design Is Taking the Con out of Econometrics". In: *Journal of Economic Perspectives* 24.2, 3–30. URL: https://www.aeaweb.org/articles?id=10.1257/jep.24.2.3

3 Video of Abhijit Banerjee's Nobel Speech (2019) https://youtu.be/XvyMO7CmFlk

3 S. D. Levitt and J. A. List (2008). *Field Experiments in Economics: The Past, The Present, and The Future*. Working Paper 14356. National Bureau of Economic Research. URL: http://www.nber.org/papers/w14356

4 V. L. Smith (2010). "Experimental Methods in Economics". In: *Behavioural and Experimental Economics*. Ed. by S. N. Durlauf and L. E. Blume. London: Palgrave Macmillan UK,. 120–136. URL: https://doi.org/10.1057/9780230280786_16

4 P. Andrea and A. Falk (2021). "What's Worth Knowing? Economists' Opinions about Economics". In: *IZA DP* Working Paper.14527. URL: https://ftp.iza.org/dp14527.pdf

5 R. J. LaLonde (1986). "Evaluating the Econometric Evaluations of Training Programs with Experimental Data". In: *The American Economic Review* 76.4, 604–620. URL: http://www.jstor.org/stable/1806062

5 E. E. Leamer (1983). "Let's Take the Con Out of Econometrics". In: *The American Economic Review* 73.1, 31–43. URL: http://www.jstor.org/stable/1803924

6 F. A. v. Hayek (1942). "Scientism and the Study of Society. Part I". in: *Economica* 9.35, 267–291. URL: http://www.jstor.org/stable/2549540

6 M. P. Keane (2010). "A Structural Perspective on the Experimentalist School". In: *Journal of Economic Perspectives* 24.2, 47–58. URL: https://www.aeaweb.org/articles?id=10.1257/jep.24.2.47

7 A. Brodeur, N. Cook, and A. Heyes (2020). "Methods Matter: p-Hacking and Publication Bias in Causal Analysis in Economics". In: *American Economic Review* 110.11, 3634–60. URL: https://www.aeaweb.org/articles?id=10.1257/aer.20190687

7 J. A. Weill et al. (2021). *Researchers' Degrees-of-Flexibility and the Credibility of Difference-in-Differences Estimates: Evidence From the Pandemic Policy Evaluations*. Working Paper 29550. National Bureau of Economic Research. URL: http://www.nber.org/papers/w29550

8 A. Deaton (2010). "Instruments, Randomization, and Learning about Development". In: *Journal of Economic Literature* 48.2, 424–55. URL: https://www.aeaweb.org/articles?id=10.1257/jel.48.2.424

8 J. J. Heckman and R. Pinto (2022). *Causality and Econometrics*. Working Paper 29787. National Bureau of Economic Research. URL: http://www.nber.org/papers/w29787, Ch. 1, 2

9 J. Rust (2014). "The Limits of Inference with Theory: A Review of Wolpin (2013)". In: *Journal of Economic Literature* 52.3, 820–50. URL: https://www.aeaweb.org/articles?id=10.1257/jel.52.3.820

9 P. E. Todd and K. I. Wolpin (2021). "The Best of Both Worlds: Combining RCTs with Structural Modeling". In: *Journal of Economic Literature* Forthcoming. URL: https://www.aeaweb.org/articles?id=10.1257/jel.20211652

10 Video of Angus Deaton's Nobel Speech (2015) https://nobelmedia.akamaized.net/flashcontent/lecture_2015_eco_deaton_01_496.mp4

11 Daniel McFadden's Nobel Speech (2000) https://nobelmedia.akamaized.net/flashcontent/lecture_2000_eco_mcfadden_01_496.mp4

12 James Heckman's Nobel Speech (2000) https://nobelmedia.akamaized.net/flashcontent/lecture_2000_eco_heckman_01_496.mp4

13 Trygve Haavelmo's Nobel Speech (1989) https://www.nobelprize.org/prizes/economic-sciences/1989/ceremony-speech/

14 R. Blundell and T. M. Stoker (2005). "Heterogeneity and Aggregation". In: *Journal of Economic Literature* 43.2, 347–391. URL: https://www.aeaweb.org/articles?id=10.1257/0022051054661486

14 S. Schennach (2021). "Measurement systems". In: *Journal of Economic Literature* Forthcoming. URL: https://www.aeaweb.org/articles?id=10.1257/jel.20211355

# 4 Reference Material

This course draws mostly from my notes. My notes, however, are based on the following textbooks, and you should use at least the first one from each category. (I will also provide additional sources in the homeworks for further reading.) This is an applied course, so there will be many concrete applications with actual data. There will be very few proofs of the theoretical properties of statistical models, but instead numerical examples that illustrate the main ideas (e.g., simulations with increasing sample sizes, not deriving an asymptotic distribution). Similarly, there will be "reduced-form" equations we derive from theory, but will not prove the existence or uniqueness of equilibrium. In both cases, the reference materials contain the mathematical derivations (amongst many other things) and are the basis for my lectures.

**Nonparametric Data Analysis.**

- D. Henderson and C. Parmeter (2015). *Applied Nonparametric Econometrics*. Cambridge University Press. URL: https://www.the-smooth-operators.com/
- J. S. Racine (2019). *An Introduction to the Advanced Theory and Practice of Nonparametric Econometrics: A Replicable Approach Using R*. Cambridge University Press. URL: https://doi.org/10.1017/9781108649841
- L. Chihara and T. Hesterberg (2018). *Mathematical Statistics with Resampling and R*. Wiley. URL: https://sites.google.com/site/chiharahesterberg/home

**Data Visualization.**

- C. Wilke (2019). *Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures*. O'Reilly Media. URL: https://clauswilke.com/dataviz/
- E. Tufte (2001). *The Visual Display of Quantitative Information*. 2nd ed. Graphics Press. URL: https://www.google.de/books/edition/The_Visual_Display_of_Quantitative_Infor/qmjNngEACAAJ


**Textbooks.**


- A. Cameron et al. (2005). *Microeconometrics: Methods and Applications*. Cambridge University Press. URL: https://books.google.de/books?id=Zf0gCwxC9ocC
- W. Greene (2018). *Econometric Analysis*. Pearson. URL: http://people.stern.nyu.edu/wgreene/Microeconometrics.htm
- B. E. Hansen (2022b). *Probability and Statistics for Economists*. Princeton University Press. URL: https://www.ssc.wisc.edu/~bhansen/probability/
- B. E. Hansen (2022a). *Econometrics*. Princeton University Press. URL: https://www.ssc.wisc.edu/~bhansen/econometrics/
- R. Davidson and J. G. MacKinnon (2021). *Econometric Theory and Methods: International Edition*. Authors. URL: http://qed.econ.queensu.ca/ETM/ETM-davidson-mackinnon-2021.pdf
- J. Wooldridge (2019). *Introductory Econometrics: A Modern Approach*. South-Western Cengage Learning. URL: https://economics.ut.ac.ir/documents/3030266/14100645/Jeffrey_M._Wooldridge_Introductory_Econometrics_A_Modern_Approach__2012.pdf
- F. Heiss (2020). *Using R for Introductory Econometrics*. Independently Published. URL: http://www.urfie.net/
- C. Hanck et al. (2020). *Introduction to Econometrics with R*. URL: https://www.econometrics-with-r.org/
- C. Adams (2020). *Learning Microeconometrics with R*. CRC Press. URL: https://sites.google.com/view/microeconometricswithr/table-of-contents
- D. N. McCloskey and S. Ziliak (2008). *The Cult of Statistical Significance: How the Standard Error Costs Us Jobs, Justice, and Lives*. University of Michigan Press. URL: https://books.google.de/books?id=JWLIRr%5C_ROgAC