Syllabus for Econometrics I (Ph.D.)

Course URL: https://ecampus.uni-bonn.de/

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TA: Björn Höppner, Institute of Finance and Statistics, s6bjhoep@uni-bonn.de.

Lectures: Mondays and Thursdays from 10:00 am – 12:00 p.m. in lecture hall F.

Office Hours: Please feel free to ask questions during the lectures or after class. I will also generally be available Mondays from 2:00 - 3:00 p.m. in my office (room 2.004) or online via Zoom: https://uni-bonn.zoom.us/j/98134404309?pwd=bWMwZWJLdytQb2xsSUJOeU1aZW02Zz09
Please email in advance if you plan to stop by. You can also email me to set up an appointment outside of this time.

Course Description: This class is the first semester of the econometrics sequence for Ph.D. students. It lays the foundations for understanding how to model uncertainty in economics and for carrying out empirical research in economics.

We start with an introduction to probability theory and the most important statistical concepts, including random variables and their properties, modes of convergence, point estimation, hypothesis testing, and confidence intervals. We will then discuss the linear regression model in detail, including different interpretations, algebraic properties, as well as small sample and large sample results.

The second semester (Econometrics II) covers more advanced topics, including instrumental variable estimation, time series models, panel data models, nonlinear models, such as the probit and logit models, and GMM.

Readings: We will use the following two main references:

- Casella, G. and R. Berger, Statistical Inference, Duxbury Resource Center, 2001.

- Hansen, B., Econometrics, https://www.ssc.wisc.edu/~bhansen/econometrics/.

We will cover parts of Casella and Berger in the first half of the semester. We will mainly focus on the material that is most important to understand econometrics related topics, and we will therefore skip many sections. In addition to the textbook, I will distribute handouts that summarize the most important results. I still recommend that you read the book. For the subsequent parts, we will use Hansen's textbook, which is a graduate level textbook and can be freely downloaded, as well as additional handouts. Hansen has another textbook on his website, which is also a useful reference for the first part of the semester.

Software: Some of the problem sets will require using statistical software to implement estimators and perform simulation studies. In principle, the choice of the software is left to the students, but we highly recommend to use either R or MATLAB.

R is a programming language and software environment for statistical computing and graphics, which is very popular in statistics and has the huge advantage that it is free. More information can be found at https://www.r-project.org/. I wrote a brief introduction to R that covers most of the concepts we will use in Econometrics I and II. Here is the link:

https://bookdown.org/joachimfreyberger/r_econometrics_1/_book/

Information about downloading and installing MATLAB can be found https://www.hrz.uni-bonn.de/de/services/software-hardware/pc-anwendungen/math.anwendungen/matlab

Additional TA Sessions: We will set up some additional sessions for the students to meet with the TA. Björn will give an introduction to R and go through the solutions to exercises assigned to the students. We will announce the times later in the semester.

Problem Sets: I will distribute roughly bi-weekly problem sets (5 in total) that will require you to implement some of the methods discussed in class. By turning in the problem sets, you can earn up to 5 bonus points for the final. You can work in small groups (4 students max), but each student must turn in individual solutions.

Midterm Exam: There will be a midterm exam, which will be on Thursday, Dec 9. By taking the midterm exam, you can earn up to 15 bonus points for the final.

Final Exam: The final exam will be two hours and will have 130 points in total. I will grade the final and decide on cut-off points for the different grades. I will then add the bonus points to the final exam scores and determine overall grades based on the sum. There are two caveats: you can improve your grade by at most 0.7 and you cannot improve a failing grade.