ECONOMETRICS I

FALL 2020

Department of Economics, Universidad Carlos III de Madrid

- **Instructor:** Dr. Juan Carlos Escanciano, 15.2.19, email: jescanci@eco.uc3m.es (6198).
- **TA:** Joël Robert Terschuur, email: jrobert@eco.uc3m.es.
- **Time and Location:** TT 10:45AM-12:15PM. Practice (F 12:30 - 14:00).
- **Instructor Office Hours:** TT 2:30-4:00 or by appointment.
- **Basic Textbook:** Shao, J. (2003). Mathematical Statistics. Springer.
- **Other material**: Lecture Notes.
- **Suplementary Textbooks:**

1. Bickel, P.J. and K.A. Doksum (2015). Mathematical Statistics: Basic Ideas and Selected Topics.
2. Billingsley, P. (1986). Probability and Measure, Willey.
3. Casella, R.and J. Berger (2002). Statistical Inference, 2nd Edition. Duxburry.
4. Chow, Y.S. and H. Teicher (1997). Probability Theory, Springer.
5. Davidson, J. (1994). Stochastic Limit Theory, Oxford Economic Press.
6. Durret, R. (2019). Probability: Theory and Examples, Cambridge, 4th Edition.
7. Hansen, B. (2018). Econometrics. Lecture Notes Wisconsin.
8. Jacod, J. and P. Protter (2003). Probability Essentials. 2end Edition, Springer.
9. Lehman, E.L. (2004). Elements of Large-Sample Theory, Springer.
10. Lehman, E.L. and Casella, G. (2001). Theory of Point Estimation, Springer.
11. Lehman, E.L. and Romano, J.R. (2005). Testing Statistical Hypothesis, Springer.
12. Mittelhammer, R. (1992). Mathematical Statistics for Economics and Business. Springer-Verlag.
13. Serfling, R. (1980). Approximation Theorems of Mathematical Statistics. Wiley.
14. Van der vaart, A.W. (1998). Asymptotic Statistics. Cambridge University press.
15. Wasserman, L. (2006). All of Nonparametric Statistics. Springer.
16. White, H. (1986). Asymptotic Theory for Econometricians. Academic Press.
17. Young, G.A and R.L. Smith (2010). Essentials of Statistical Inference. Cambridge Series.

Course Objectives

This is the first course in Econometrics for the Economics Ph. D. program at University Carlos III de Madrid and it provides the probability and statistics foundation for Econometrics II as well as the rest of quantitative courses taught in our Ph.D. program. The course assumes that the student has knowledge of Calculus, Algebra and Statistics needed for standard Econometrics courses at a undergraduate level. At the end of the course the student is expected to acquire the probability and statistical tools needed to read research articles in professional journals.

Syllabus

PART I: PROBABILITY THEORY

1.- Probability spaces and random elements.
2.- Integration and differentiation.
3.- Distribution and its characteristics.
4.- Conditional expectations.
5.- Asymptotic theorems.

PART II: STATISTICAL INFERENCE

1.- Statistical Models.
2.- Identification and mispecification.
3.- Data Reduction: Sufficiency.
4.- Statistical decision theory and Asymptotics.
5.- Estimation in parametric models (LSE, Ridge, Lasso, MM, MLE).
6.- Testing.

- **Grading:** The final grade is based on four assignments (20%), a mid-semester examination (25%), and a final examination (55%).
- **Assignments:** There will be four compulsory assigments during the semester. You may discuss assignments in groups, but should write up your answers independently. Any requests for clarification or help with the assignment questions prior to grading should be directed to me (by email if convenient).
- **Exams:** The Midterm will take place on **November 5th**, at 10.45 - 12.45 (at 15.0.14). There will be no class the week before. The date for the final exam will be announced.