University of Colorado - Department of Economics
Econ 8828 - Seminar in Econometrics - Fall 2015
Professor Carlos Martins-Filho

O ce. Economics Building 105

Meetings. Tuesdays and Thursdays from 2:00 PM - 3:15 PM in ECON 5.

O ce hours. Tuesdays 3:15 PM - 5:15 PM and by appointment. For appointment send an email to carlos.martins@colorado.edu.

Class URL. http://spot.colorado.edu/ martinsc/Econ _8828.html

Prerequesites. ECON 7828 (or equivalent) or consent of instructor.

Objectives. This is the rst course of the sequence Econ 8828-8838. This sequence is the core of a Ph.D. eld in Econometrics. The course objectives are:

2. Davidson, R. and MacKinnon, J. G., 2003, Estimation and Inference in Econometrics, Oxford University Press.

3. Newey, W. and McFadden, D., 1994, Large sample estimation and hypothesis testing. In Handbook of Econometrics IV, R. Engle and D. McFadden Editors, Chapter 36.

4. Tsybakov, A., 2009, Introduction to Nonparametric Estimation, Springer, New York.

5. van der Vaart, A., 1998, Asymptotic Statistics, Cambridge University Press, Cambridge.

6. I will distribute class notes. Read them carefully. They re ect my view of what are the most important concepts and results we cover in the course.

Topics.

1. Probability
   (a) Probability spaces
   (b) Continuity of probability measures
   (c) Conditional probability, independence and Bayes Theorem
   (d) Borel-Cantelli Lemma
   (e) Construction of probability measures: and systems, Dynkin's Theorem
   (f) The distribution function induced by a probability measure
2. Random elements
   (a) Measurable functions and random elements
   (b) Probability measures induced by random elements
   (c) -algebras generated by random variables
   (d) Independent random variables
3. Expectation
   (a) Measurability Theorem
   (b) Expectation of simple functions and extensions to general functions
   (c) Properties of expectations
      i. Monotone convergence theorem
      ii. Inequalities: Modulus, Markov's, Chebyshev's
      iii. Dominated convergence theorem
   (d) Riemann vs. Lebesgue integral
   (e) Product spaces and joint measures
   (f) Conditional expectation
   (g) Radon-Nikodym derivative
4. Convergence
   (a) Almost sure convergence
   (b) Convergence in probability
   (c) L_p convergence

(d) Uniform integrability

(e) Moment inequalities: Schwartz's, Holder's, Minkowski's, Jensen's, Lyapounov's

(f) Convergence in distribution

i. Schee's Lemma

ii. Skorohod's Theorem

iii. Delta method and the Continuous Mapping Theorem

iv. Characteristic functions: uniqueness and continuity theorems

v. Portmanteau Theorem

(g) Weak Law of Large Numbers for IID sequences

(h) Central Limit Theorem for IID sequences

(i) Convergence of Moments

(j) Lindeberg-Feller Theorem

5. Parametric models

(a) Identi cation

(b) Loss functions and Extremum (M) estimation

i. Linear and nonlinear least squares (LS)

ii. Maximum likelihood (ML)

iii. Method of moments (MM)

iv. Minimum distance (MD)

(c) Z-estimation

(d) Consistency: LS, ML, MM, MD

(e) Stochastic equicontinuity and uniform convergence

(f) Asymptotic Normality: LS, ML, MM, MD

(g) Estimation of Covariances of Asymptotic Distributions

(h) Asymptotic E ciency

(i) Feasible estimation

(j) Two-Step estimation

6. Hypothesis testing for parametric models

(a) Basic concepts: level, asymptotic power functions, relative e ciency

(b) Likelihood ratio tests

(c) Wald and Score tests

7. Nonparametric and semiparametric models

(a) Kernel density and distribution estimation

(b) Kernel regression estimation

(c) Partially linear regression models