ECON 7710
Econometrics I

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Course Description:

This part of the graduate Econometrics sequence is devoted to the foundations of Econometrics which are probability and statistics. We will discuss basic concepts such as the probability space, random variables, probability distributions. We will then proceed with the analysis of sampling theory, statistical experiments and the notion of convergence of statistics. We discuss classes of estimators and their general properties. In the final part of the course we will talk about statistical tests and their properties.

The following is an outline of the course:

- Basics of probability
  - Elements of set theory
  - Measurability and random variables
  - Probability space
  - Probability distributions
- Characterization of distributions
  - Moments of random variables
  - Moment generating functions
  - Notion of characteristric function
- Common probability distributions

- Basics of statistics
  - Notion of random sample and basic models
  - Construction of statistics from random samples
  - Notions of stochastic convergence
  - Approximation of random variables and sampling
- Statistical inference
  - Method of moments
  - M- and Z-estimators
- Evaluation of estimators and statistics
  - Efficiency of estimators
  - Bayesian estimators and procedures
- Testing
  - Relative efficiency of tests
  - Asymptotic representation theorem
  - Likelihood ratio tests

There will be 8 homeworks, a midterm and a final. The homeworks count for 10% of the final grade, the midterm counts for 30% of the grade and the final exam counts for another 60% of the course grade.

Textbook: Primary: *Statistical Inference* by G. Casella and R. Berger. Secondary: *Asymptotic Statistics* by A. van der Vaart.