

STATISTICS

University of Alicante
Graduate Program in Economics
Master Program, 1st year
Fall 2011
Instructor: M.Angeles Carnero

1 OBJECTIVES

This is a basic course on mathematical statistics in which probability and statistical theory are presented with a view to applying them to econometric methodology. The course is organized in two parts: Part I provides the foundations of probability theory and Part II deals with the theory of sampling, principles and properties behind the methods of estimating unknown parameters and testing hypotheses on parameters.

2 LIST OF TOPICS

Part I: Probability theory

1. Probability spaces

- 1.1. Basic concepts
- 1.2. Probability function and probability space
- 1.3. Conditional probability and independence

2. Random variables

- 2.1. Basic concepts
- 2.2. Discrete random variables
- 2.3. Continuous random variables
- 2.4. Functions of a random variable
- 2.5. Expected value of a random variable. Moments. Moment Generating Function

3. Random vectors

- 3.1. Basic concepts
- 3.2. Discrete random vectors
- 3.3. Continuous random vectors

- 3.4. Conditional distributions
- 3.5. Independence
- 3.6. Functions of a random vector
- 3.7. Expected value of a random vector
- 3.8. Conditional expectation
- 4. **Some common distributions**
 - 4.1. Univariate discrete distributions
 - 4.2. Univariate continuous distributions
 - 4.3. The multivariate normal distribution

Part II: Statistical inference

- 5. **Random samples**
 - 5.1. Random sample
 - 5.2. Sample mean, sample variance and higher order sample moments
 - 5.3. Sampling from a normal population
 - 5.4. Stochastic convergence
- 6. **Point estimation**
 - 6.1. Introduction
 - 6.2. Sufficiency
 - 6.3. Unbiasedness and efficiency
 - 6.4. Large sample properties of estimators
 - 6.5. The Method of moments
 - 6.6. Maximum likelihood
- 7. **Hypothesis testing**
 - 7.1. Basic concepts
 - 7.2. Hypothesis testing in normal populations
 - 7.3. Asymptotic tests: Likelihood ratio, Wald and Lagrange multiplier tests
 - 7.4. Confidence Intervals

BASIC REFERENCES:

"All of Statistics: a concise course in statistical inference" by L. WASSERMAN (Springer, 2005).

"Statistical Inference" by CASELLA, G. AND BERGER, R.L. (California : Duxbury Press, 2002).

COMPLEMENTARY REFERENCES:

GALLANT, A.R. (1997), An Introduction to Econometric Theory, Princeton University Press, Princeton, New Jersey.

MITTELHAMMER, R.C. (1996), Mathematical Statistics for Economics and Business, Springer, Nueva York.

ROHATGI, V.K. (1976), An Introduction to Probability Theory and Mathematical Statistics, John Wiley and Sons, Nueva York.

SPANOS, A. (1999), Probability Theory and Statistical Inference, Cambridge University.

3 METHODOLOGY

Lectures: The material of the course will be presented in the form of lectures.

Problem Sets: Students will be given problem sets which will be graded and solved in class.

4 ASSESSMENT

Students will be given problem sets and will have to hand them in on established dates. The problem sets will be graded, and the solutions to the problem sets will be discussed in class. The grade will be based on a final exam (60%), a midterm exam (30%) and problem sets (10%).

5 CONTACT INFORMATION

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