

ECO-HC-3036: STATISTICAL METHODS FOR ECONOMICS

Course Description

This is a course on statistical methods for economics. It begins with some basic concepts and terminology that are fundamental to statistical analysis and inference. It then develops the notion of probability, followed by probability distributions of discrete and continuous random variables and of joint distributions. This is followed by a discussion on sampling techniques used to collect survey data. The course introduces the notion of sampling distributions that act as a bridge between probability theory and statistical inference. The semester concludes with some topics in statistical inference that include point and interval estimation.

Course Outline

1. Introduction and Overview

The distinction between populations and samples and between population parameters and sample statistics; the use of measures of location and variation to describe and summarize data; moments – basic concepts and types.

2. Elementary Probability Theory

Sample spaces and events; probability axioms and properties; addition and multiplication theorem of probability, counting techniques; conditional probability and Bayes' rule; independence of events.

3. Random Variables and Probability Distributions

Defining random variables; probability distributions; expected values of random variables and of functions of random variables; properties of commonly used discrete and continuous distributions (uniform, binomial, poisson and normal random variables).

4. Random Sampling and Jointly Distributed Random Variables

Density and distribution functions for jointly distributed random variables- basic concepts; covariance and correlation coefficients.

5. Sampling

Principal steps in a sample survey; methods of sampling; Sampling techniques- random, stratified random, multi-stage random and systematic random sampling; the role of sampling theory; properties of random samples.

Readings:

1. Jay L. Devore, *Probability and Statistics for Engineers*, Cengage Learning, 2010.
2. John E. Freund, *Mathematical Statistics*, Prentice Hall, 1992.
3. Richard J. Larsen and Morris L. Marx, *An Introduction to Mathematical Statistics and its Applications*, Prentice Hall, 2011.
4. William G. Cochran, *Sampling Techniques*, John Wiley, 2007.

