

Statistical Method for Econometric (2017-2018)

*Departments of Economics
Course for PhD students
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The course consists into two parts: the first part refers to the basic concepts of Econometrics; PhD students can participate to the first 12-13 lessons of the Statistical Methods for Econometrics - course for Master Degrees, from 1 October to 6 November. In the second part, more complex problems are faced and lessons will take place from 8 January to 7 February for a total of 30 hours.

The contents of both parts are listed below in this document.

There are also two application modules in the laboratory, each of 20 hours, held by Dr. Giorgio D'Agostino and Dr. Davide Zurlo. In both cases applications are presented according to the theoretical lessons.

The exam will take place in March and consists of an oral interview on the subjects of the course.

Part I – from October 2 to November 6, 2017, Statistical Methods for Econometrics, Master's Degree Course

Basic Knowledge I – References to statistical inference, Basic concepts of matrix algebra

Random Variables, Distribution Functions, Density Functions, Expected Values, Moments, Conditional Distributions and Independence, Covariance and Correlation, Basic Concepts of Random Samples, Sampling from the Normal Distribution, Methods of finding Estimator, Methods of Evaluating Estimator, Hypothesis Testing.

Basic Knowledge II – Review on linear regression

Classical Linear Regression: Descriptive Linear Regression, Classical Linear Regression Model, Statistical Inference in Classical Linear Regression, Classical Normal Linear Regression Model, Statistical Inference in Classical Normal Linear Regression.

Part II – from 8 January to 7 February 2018, Ph.D Course

Extensions of linear regression

Functional forms, Analysis of variance, Nonspherical disturbances: heteroskedasticity and autocorrelation, Multicollinearity, Variables selection, Stability of the regression function, Use of auxiliary information.

System of linear regression

System of linear regression: The Model, Assumptions on error components and parameters' estimation

Seemingly Unrelated (SUR): The Model, Estimation problems and Empirical Generalized Least Squares (EGLS)

Simultaneous Equation Model: Excursus on conditions for OLS consistency, Structural and Reduced Form equations, Identification and structural parameters, Rank and order conditions for structural parameters identification

Structural parameters estimation: Consequences of order conditions, Exact identification: Indirect Least Squares Estimators (ILS), Over identification: Limited and Full Information methods, Two Stage Least Squares estimator (2SLS), Consistency of 2SLS, Three Stage Least Squares (3SLS), Alternative interpretation of 2SLS and 3SLS, Limited Information and Full Information Maximum Likelihood

Time Series Analysis

First-Order Difference Equations, pth-Order Difference Equations, Lag Operators, Stationary ARMA Processes, Forecasting, Maximum Likelihood Estimation, Spectral Analysis, Vector Autoregression.

Introduction to Panel Data Models

Fixed effects models: Least squares dummy variable fixed approach,

Random effects models: estimation of variance-components models The appropriateness of fixed effects and random effects estimation.

Books

- Statistical Inference, G. Casella, R. L. Berger, 2nd Edition, Duxbury Advanced Series
- Matrix Differential Calculus with applications in statistics and econometrics, J. R. Magnus, H. Neudecker, Wiley Series in Probability and Statistics
- Econometric Analysis, W. H. Greene, 5th Edition, Prentice Hall
- Time Series Analysis, J. D. Hamilton, Ed. Princeton
- Analysis of Panel Data, C. Hsiao, Ed. Cambridge
- New Introduction to Multiple Time Series Analysis, H. Lutkepohl, Springer