

Instituto Superior de Economia e Gestão
Universidade de Lisboa
PhD in Economics
Advanced Topics in Econometrics
(Academic Year: 2025/2026)

Module Lecturer: Paulo M.D.C. Parente

Contact details:

Office: Room 106, Quelhas no. 4

email-address: pparente@iseg.ulisboa.pt

Webpage: <https://sites.google.com/site/paulomdcparente/>

Module Outline and Information

1 Objectives

- To explore important theoretical questions of microeconometrics and macroeconometrics that are not usually taught at the BSc and MSc levels in economics;
- To provide the students with the necessary econometric and methodological research tools to equip them for carrying out research projects.
- To develop the students' ability for doing research.

2 Prerequisite knowledge

It was assumed that the students possessed the following prerequisite knowledge:

- In Mathematics: Limits; Univariate and Multivariate Functions; Derivatives; Integrals; Infinite series (including Taylor expansions); Univariate and Multivariate Unconstrained Optimization; Constrained Optimization
- In Linear Algebra: Vectors and Matrices; Basic Operations on Vectors and Matrices; Linear Dependence and Rank; Determinant; Inverse of a Matrix; Classification of Quadratic forms; Eigenvalues and Eigenvectors.
- In Statistics: Probability; Discrete Probability Distributions, Continuous Probability Distributions and Mixed Probability Distributions; Expected Values, Variances and their Properties; Multivariate Distributions; Covariance and Correlation; Conditional Probabilities and Conditional Probability Distributions; Basics on Asymptotic Theory: Convergence in Probability and Convergence in Distribution; Sampling and Sampling Distributions; Estimators: Unbiasedness, Efficiency, Consistency and Asymptotic Normality; Method of Moments; Maximum Likelihood; Hypothesis Testing and Confidence Intervals.
- In Econometrics: Linear Regression Model; Properties in Finite Samples and in Large Samples of the Ordinary Least Squares (OLS) estimator; Statistical Inference; Binary Explanatory Variables; Functional Forms; Heteroskedasticity; Time Series Regression Models; Autocorrelation.

3 Syllabus Plan

Topics covered in Advanced Topics in Econometrics (PhD in Mathematics Applied to Economics and Management) and Advanced Econometrics (PhD in Economics):

1. Topics in Microeconometrics:
 - (a) Maximum Likelihood Estimation.
 - (b) Binary Choice Models.
 - (c) Ordered Data and Count Data Models.
 - (d) Limited Dependent Variable Models.
2. Topics in Time Series
 - (a) Univariate Time Series Models.
 - (b) Multivariate Time Series Models.
 - (c) Advanced topics in Unit Roots and Cointegration.

Additional topics covered in Advanced Topics in Econometrics (PhD in Mathematics Applied to Economics and Management)

1. Semiparametric and Nonparametric Methods in Econometrics.
2. Bootstrap.
3. Panel Data Models
4. GARCH Models

4 Assessment

The final grade for the student is determined using the formula $\text{Max}\{\mathbf{Exam}, 0.65 \times \text{Exam} + 0.35 \times \mathbf{Assignment}\}$.

Exam refers to the mark obtained in the regular season exam, which is a three-hour exam.

Assignment refers to the mark received for an optional assignment. Students are responsible for proposing the topic and gathering the data for their assignment, which must focus on one of the chapters covered in the lectures.

Students who fail the module in the regular season can take a resit exam, which is also a three-hour exam.

During the exams, students may consult only two sheets (four sides of A4) of notes, which must be prepared exclusively by them.

Students are responsible for printing the statistical tables available on the module's website in fenix and bringing them to the exam. Writing any notes on the statistical tables is not permitted.

5 Indicative Learning Resources

Cameron, A. C. e Trivedi P. K. (2005). Microeconometrics, methods and applications, Cambridge University Press.

Enders, W. (2014), Applied Econometric Time Series, Wiley

Greene, W. (2017) Econometric Analysis, 8th Edition, Pearson (recommended textbook)

Hamilton, J. D. (1994), Time Series Analysis, Princeton University Press.

Wooldridge, J.M. (2010). Econometric Analysis of Cross Section and Panel Data , 2nd Edition, MIT Press