



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Analisi delle Serie Economiche Temporali e Longitudinali M

2627-1-F8206B001

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#### Learning objectives

The course includes two modules: Economic Time Series and Microeconometrics. Economic Time Series aims at providing the knowledge needed to analyse economic time series, both univariate and multivariate. This course provides a comprehensive understanding of non-stationary univariate time series and vector autoregressive processes, focusing attention on their use for forecasting and dynamic analysis. It also describes how to test the cointegration relationships between economic variables and to analyse deviations from a long-run equilibrium. By the end of the course, students are expected to acquire:

- the knowledge of advanced statistical methods to analyse time series;
- the ability to analyse univariate and multivariate time series describing economic variables;
- the ability to interpret the results obtained from time series analysis.

Microeconometrics aims at providing students with advanced instruments, both theoretical and empirical, to estimate models for panel data (static and dynamic), models for qualitative response variables, models for limited dependent (i.e. censored and truncated) variables, models for count data and duration models.

At the end of the course students will be able to apply the techniques illustrated during lectures and classes to real situations, since they have developed adequate critical skills to choose the appropriate tools of investigation and to interpret the empirical findings.

#### Contents

Economic Time Series:

non-stationary univariate time series;  
unit root tests;  
stationary multivariate time series;

vector autoregressive models (VAR);  
cointegration;  
error correction mechanism (ECM);  
cointegration tests.

Microeconometrics:

- Introduction, motivation and definitions
- Models for pooled time series
- Models for longitudinal data
- Panel data and two-way models
- Dynamic panel data models
- Models for qualitative dependent variables: binary choices
- Models for qualitative dependent variables: multiple choices
- Models for limited dependent variables: censoring and truncation
- Count data models
- Duration models

## **Detailed program**

Economic Time Series:

non-stationary economic time series;  
trend-stationary and unit root processes;  
unit root tests;  
vector autoregressive processes (VAR);  
conditions for stationary VAR processes;  
estimation of VAR models;  
use of VAR models: forecasting, the Granger causality test, the impulse-response function;  
spurious regression;  
cointegration;  
error correction mechanism (ECM);  
Granger's representation theorem;  
ECM estimation;  
cointegration tests.

Microeconometrics:

- Summary of introductory estimation techniques (OLS, GLS, IV)
- Cross-sectional heteroskedasticity and autocorrelation
- Fixed effects (OLS estimator with dummy variables, within transformation)

- Random effects, uncorrelated with the regressors (GLS estimator, between transformation)
- Random effects, correlated with some regressors (IV estimator)
- Two-way panel data models: fixed and random effects
- Dynamic panel data models: first differences, IV and GMM estimators
- Models for qualitative dependent variables: binary choices (Logit and Probit)
- Models for qualitative dependent variables: multiple choices (Multinomial and Conditional Logit, Nested Logit)
- Models for limited dependent variables: censoring and truncation (Tobit)
- Count data models (Poisson and Negative Binomial)
- Duration models

## **Prerequisites**

A solid knowledge of time series analysis and the statistical software R is recommended. Introductory notions of econometrics, micro economics and macroeconomics are taken for granted.

## **Teaching methods**

The course includes 84 hours of frontal lessons, 42 hours for each module.

## **Assessment methods**

A written exam for each module.

## **Textbooks and Reading Materials**

Zavanella, B. (2004) Modelli per le serie storiche non stazionarie e multivariate. Editore: CUSL.

W. Greene, Econometric Analysis, Prentice Hall International, 4<sup>a</sup> edizione, 2002

G.S. Maddala, Limited-Dependent and Qualitative Variables in Econometrics, Cambridge University Press, 1983

M. Manera, M. Galeotti, Microeconometria, Metodi e Applicazioni, Carocci, 2005

J.M. Wooldridge, Econometric Analysis of Cross Sections and Panel Data, The MIT Press, 2002

**Semester**

Second semester.

**Teaching language**

Italian

**Sustainable Development Goals**

QUALITY EDUCATION

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