# Analysis of dynamic data

**Academic Year: ( 2021 / 2022 )** **Review date: 22-06-2021**

**Department assigned to the subject: Statistics Department**

**Coordinating teacher: RUIZ ORTEGA, ESTHER**

**Type: Electives ECTS Credits : 6.0**

**Year : Semester :**

## REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Statistics I
Statistics II

## OBJECTIVES

1. Construction of forecasts for decision making in a context of uncertainty, in which managers need to take into account the consequences of all posibilities.
2. Represent the dynamic dependence of univariate and multivariate variables describing the main dynamic properties: trends, seasonal components and cicles.
3. Measure the dependence beween economic and financial variables observed along time.
4. Measure the volatility of financial variables to obtain, for example, the Value at Risk or forecast intervals for financial returns.

Interpretation of data. Use of software designed for the analysis of data.

## DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction
1.1 Dynamic data in business administration problems
1.2 Objetives of the analysis of dynamic data: description of the evolution and forecasting
1.3 Diferences between temporal and cross-sectional data: dependence and heterogeneity
1.4 Stochastic processes: stationarity
1.5 Marginal and conditional distributions. Uncorrelatedness and independence
1.6 Examples: Sales, oil prices, IBEX prices

2. Linear models: Forecasting
2.1 ARMA models: properties
2.2 Fitting ARMA models: estimationa and diagnosis
2.3 Forecasting using ARMA models
2.4 Forecast evaluation
2.5 Evolution and forecasts of Google Trends variables

3. Multivariate models: relationships between variables
3.1 Caracteristics of VAR models
3.2 Dynamic regression models
3.3 Transfer functions
3.4 Forecasts in dynamic regression models
3.5 Cointegration: Equilibrium correction models
3.6 Measuring the dynamic relationship beween international prices

4. Models for volatilities
4.1 Empirical caracteristics of financial variables
4.2 Properties of GARCH models
4.3 Forecasting volatilities: Computing Value at risk
4.4 Analysis of IBEX returns
4.5 Multivariate GARCH models
4.6 Correlations between exchange rate returns: Portfolio management

## LEARNING ACTIVITIES AND METHODOLOGY

The course will have a face-to-face part classroom where both blackboard and audiovisual media are used to present the main concepts. In addition, there will be practical classes in computer classrooms where students will learn to use the software necessary to implement models in real data.

## ASSESSMENT SYSTEM

60% of the final grade will be obtained in the final exam. It will be necessary to get at least 5 points out of 10 in that final exam to pass the course. 40% remaining from the final grade corresponds to the continuous evaluation of the knowledge and skills acquired by the student at the theoretical level and in the resolution of practical problems and data analysis. This continuous evaluation will consist of two partial tests. Each of them corresponds to 20% of the final grade

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| **% end-of-term-examination:** | 60 |
| **% of continuous assessment (assigments, laboratory, practicals…):** | 40 |

## BASIC BIBLIOGRAPHY


- BROOKS, C. Introductory Econometrics for finance, Cambridge University Press (2002).
- González-Rivera, G. Forecasting for Economics and Business, Pearson/Addison-Wesley, 2013


## ADDITIONAL BIBLIOGRAPHY


- MILLS, C.T. The econometric modelling of financial time series, Cambridge University Press (1999).