Analysis of dynamic data

Department assigned to the subject: Department of Statistics
Coordinating teacher: RUIZ ORTEGA, ESTHER
Type: Compulsory  ECTS Credits : 6.0
Year : 3 Semester : 2

STUDENTS ARE EXPECTED TO HAVE COMPLETED
Statistics I
Statistics II

COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS.
1. Construction of forecasts for decision making in a context of uncertainty, in which managers need to take into account the consequences of all possibilities.
2. Represent the dynamic dependence of univariate and multivariate variables describing the main dynamic properties: trends, seasonal components and cycles.
3. Measure the dependence between 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 Objectives of the analysis of dynamic data: description of the evolution and forecasting
   1.3 Differences 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: estimation 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 Characteristics 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 between international prices
4. Models for volatilities
   4.1 Empirical characteristics 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.

<table>
<thead>
<tr>
<th>% end-of-term-examination:</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of continuous assessment (assignments, laboratory, practicals...):</td>
<td>40</td>
</tr>
</tbody>
</table>

BASIC BIBLIOGRAPHY
- González-Rivera, G. Forecasting for Economics and Business, Pearson/Addison-Wesley, 2013

ADDITIONAL BIBLIOGRAPHY